The Harman Kardon Model hk 450

AM/FM/Stereo FM Solid State Receiver

Technical Manual

harman/kardon

PRECAUTIONS

1. Always disconnect the chassis from power line when soldering. Turning the power switch OFF is not enough. Power line leakage passing through the heating element may destroy the transistors.

2. Never attempt to do any work on the transistor amplifiers without first disconnecting the AC line cord and waiting until the power supply filter capacitors have discharged.

3. Replacement for output and driver transistors, if necessary, must be made from the same beta group as the original type.

4. If one output transistor burns out (open or short) always remove all the output transistors in that channel and check the bias adjustment, the control and other parts in the network with an ohmmeter before inserting a new transistor. All transistors in one channel will be destroyed if the base biasing circuit is open on the emitter end.

5. When mounting a replacement power transistor, be sure that the bottom of the flange, the mica insulators and the surface of the heat sink are free of foreign matter, for they may cause transistor failure.

6. Silicon grease must be applied between the transistor and the mica insulator, and between the mica insulator and the heat sink for better heat conduction.

7. Fuses must be replaced with size and type indicated. Use of other types can expose components to destructive current levels.

NOTE TO WARRANTY STATIONS: Printed circuit board assembly numbers are shown for reference only. Harman/Kardon does not normally supply assembled printed circuit boards.

NOTE: To speed handling of your order be sure to include both the model and serial numbers, in addition to the quantity, part number and part description of the items ordered. Orders from independent dealers, independent servicemen, and retail customers will be shipped on a cash in advance basis. Harman/Kardon reserves the right to substitute equivalent parts for those originally installed in this chassis. All parts should be ordered from Harman/Kardon, 55 Ames Court, Plainview, L.I., N.Y. 11803, Att: Parts Department.

ALIGNMENT PROCEDURES

AM ALIGNMENT PROCEDURE

INSTRUMENTS: *AM Signal Generator modulated with 400Hz at 30%.
*AM IF Sweep Generator.
*Oscilloscope.
*V. T. V. M..

NOTE: *Set function selector switch to AM position.
*Connect signal into standard loop to radiate signals into AM antenna loop stick (L251).

Step	SIGNAL SOURCE GENERATOR	SIGNAL SOURCE FREQUENCY	CONNECT OUTPUT METER TO	DIAL SETTING	ADJUST	ADJUST FOR
1	AM IF sweep generator	455 kHz	V. T. V. M. and oscilloscope for R267 (4.7 k ohm)	Quiet point on band	T251	Maximum output and best symmetry on oscilloscope
2					T252	
3	Repeat steps 1 and 2 for best sensitivity					
4	AM signal generator	600 kHz	V. T. V. M. and oscilloscope to R267 (4.7 k ohm)	600 kHz	L252	Maximum otuput
5		1400 kHz		1400 kHz	TC202	
6	Repeat steps 4 and 5 for best dial accuracy					
7	AM signal generator	600 kHz	V. T. V. M. and oscilloscope to R267 (4.7 k ohm)	600 kHz	L251	Maximum output
8		1400 kHz		1400 kHz	TC201	
9	Repeat steps 7 and 8 for best sensitivity					

TUNING METER ADJUSTMENT

INSTRUMENTS: *FM Signal Generator modulated with 1000Hz at 100%.
*Oscilloscope.
*V. T. V. M..

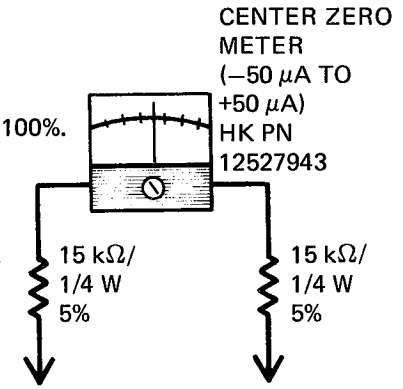
NOTE: *Set function selector switch to FM position.
*Connect signal source to FM antenna terminals.

Step	SIGNAL SOURCE FREQUENCY	SIGNAL SOURCE STRENGTH	CONNECT OUTPUT METER TO	DIAL SETTING	ADJUST	ADJUST FOR
1	98 MHz	20 μV	V. T. V. M. and oscilloscope to tape out 1 jack	Near 98 MHz	Tuning control	Maximum tuning meter indication
2		1 mV		Preset point	VR201	Indicating 9 on tuning meter

FM ALIGNMENT PROCEDURE

INSTRUMENTS:
*FM Signal Generator modulated with 1000Hz at 100%.
*Oscilloscope.
*Distortion Meter.
*Center Zero Meter. (Described at right →)
*V. T. V. M..

NOTE:
*Set function selector switch to FM position.
*Set FM muting switch to OFF (button out) position.
*Connect signal source to FM antenna terminals.



Step	SIGNAL SOURCE FREQUENCY	SIGNAL SOURCE STRENGTH	CONNECT OUTPUT METER TO	DIAL SETTING	ADJUST	ADJUST FOR
1			Oscilloscope to R217 (10 k ohm)	Quiet point on band	T101	Maximum noise
2			Center zero meter to R214 (47 k ohm) and LP108. Oscilloscope to tape out 1 jack		T201	Indicating zero on center zero meter
3	98 MHz	1mV		Near 98 MHz	Tuning control	
4		1 mV	Distortion meter to tape out 1 jack	Preset point	T202	Minimum reading on distortion meter
5	Repeat steps 2 through 4 until no further improvement is noticed					
6	90 MHz	2 μV	V. T. V. M. and oscilloscope to tape out 1 jack	90 MHz	L105	Maximum output
7	106 MHz			106 MHz	TC103	
8	Repeat steps 6 and 7 until no further improvement is noticed.					
9	90 MHz	1 μV	V. T. V. M. and oscilloscope to tape out 1 jack	90 MHz	L102, L103	Maximum output
10	106 MHz			106 MHz	TC101, TC102	
11	Repeat steps 9 and 10 until no further improvement is noticed.					

MUTING SENSITIVITY AND BANDWIDTH ADJUSTMENT

INSTRUMENTS: *FM Signal Generator modulated with 1000Hz at 100%.
*Oscilloscope.
*V. T. V. M..
*Frequency Counter.

NOTE: *Set function selector switch to FM position.
*Set the FM muting switch to ON (button in) position.
*Connect signal source to FM antenna terminals.

Step	SIGNAL SOURCE FREQUENCY	SIGNAL SOURCE STRENGTH	CONNECT OUTPUT METER TO	DIAL SETTING	ADJUST	ADJUST FOR
1	98 MHz	20 μV	V. T. V. M. and oscilloscope to tape out 1 jack	Near 98 MHz	Tuning control	Maximum tuning meter indication
2		3.16 μV		Preset point	VR203	Mute threshold; signal appears on scope
3		1 mV			FM signal generator frequency	Turn frequency dial clockwise until signal disappears from oscilloscope, and note the frequency of FM signal on frequency counter
4						Turn frequency dial counter-clockwise until signal disappears from oscilloscope and note the frequency of FM signal on frequency counter
5					VR202	Repeat steps 3 and 4, and adjust until the difference of frequencies from step 3 and 4 becomes 125±25kHz

FM STEREO INDICATOR ADJUSTMENT

INSTRUMENTS: *FM Stereo Signal Generator.
*Oscilloscope.
*V. T. V. M..

NOTE: *Set function selector switch to STEREO FM position.
*Connect signal source to FM antenna terminals.
*Set main signal OFF, and Pilot signal to 10% on FM Stereo signal generator.

Step	SIGNAL SOURCE FREQUENCY	SIGNAL SOURCE STRENGTH	CONNECT OUTPUT METER TO	DIAL SETTING	ADJUST	ADJUST FOR
1	98 MHz	20 μV	V. T. V. M. and oscilloscope to tape out 1 jack	Near 98 MHz	Tuning control	Maximum tuning meter indication
2		25 μV		Preset point	VR204	FM stereo indicator lights

SEPARATION ADJUSTMENT

INSTRUEMNTS: *FM Stereo Signal Generator.
*Oscilloscope.
*V. T. V. M..

NOTE: *Set function selector switch to STEREO FM position.
*Connect signal source to FM antenna terminals.

Step	SIGNAL SOURCE		CONNECT OUTPUT METER TO	DIAL SETTING	ADJUST	ADJUST FOR
	FREQUENCY	STRENGTH				
1	Set main signal OFF, and pilot to 10% on FM stereo signal generator					
2	98 MHz	20 μV	V. T. V. M. and oscilloscope to tape out 1 jack	Near 98 MHz	Tuning control	Maximum tuning meter indication
3		1 mV	V. T. V. M. to Rch tape out 1 jack	Preset point	VR302	Minimum output
4			V. T. V. M. to Lch tape out 1 jack		VR302	Best compromise between present and previous output ± 4dB
5	Set main signal ON, and pilot signal to 10% on FM stereo signal generator.					
6	98 MHz (Right chan. modulation)	1 mV	V. T. V. M. to Lch tape out 1 jack	Preset point	VR303	Minimum ojtput
7	98 MHz (Left chan. modulation)		V. T. V. M. to Rch tape out 1 jack		VR303	Best compromise between present and previous output ± 3dB

MPX OSCILLATOR FREQUENCY ADJUSTMENT

INSTRUMENTS: *Frequency Counter.
*FM Signal Generator.
*Oscilloscope.
*V. T. V. M..

NOTE: *Set function selector switch to STEREO FM position.
*Connect signal source to FM antenna terminals.

Step	SIGNAL SOURCE		CONNECT OUTPUT METER TO	DIAL SETTING	ADJUST	ADJUST FOR
	FREQUENCY	STRENGTH				
1	98 MHz	20 μV	V. T. V. M. and oscilloscope to tape out 1 jack	Near 98 MHz	Tuning control	Maximum tuning meter indication
2	98 MHz (No modulation)	1 mV	Frequency Counter to R333 (100 k ohm)	Preset point	VR301	76 kHz ±200 Hz

OUTPUT DC VOLATGE ZERO ADJUSTMENT

INSTRUMENT REQUIRED: *D. C. V. T. V. M..

NOTE: *Set function selector switch to AUX position.
*Set volume control to minimum position.
*Press in speaker 1 push switch to ON (button in) position.

Step	CONNECT OUTPUT METER TO	ADJUST	ADJUST FOR
1	D. C. V. T. V. M. to Rch terminal of speaker system 1	VR401	0 ± 10 mV D. C.
2	D. C. V. T. V. M. to Lch terminal of speaker system 1	VR402	

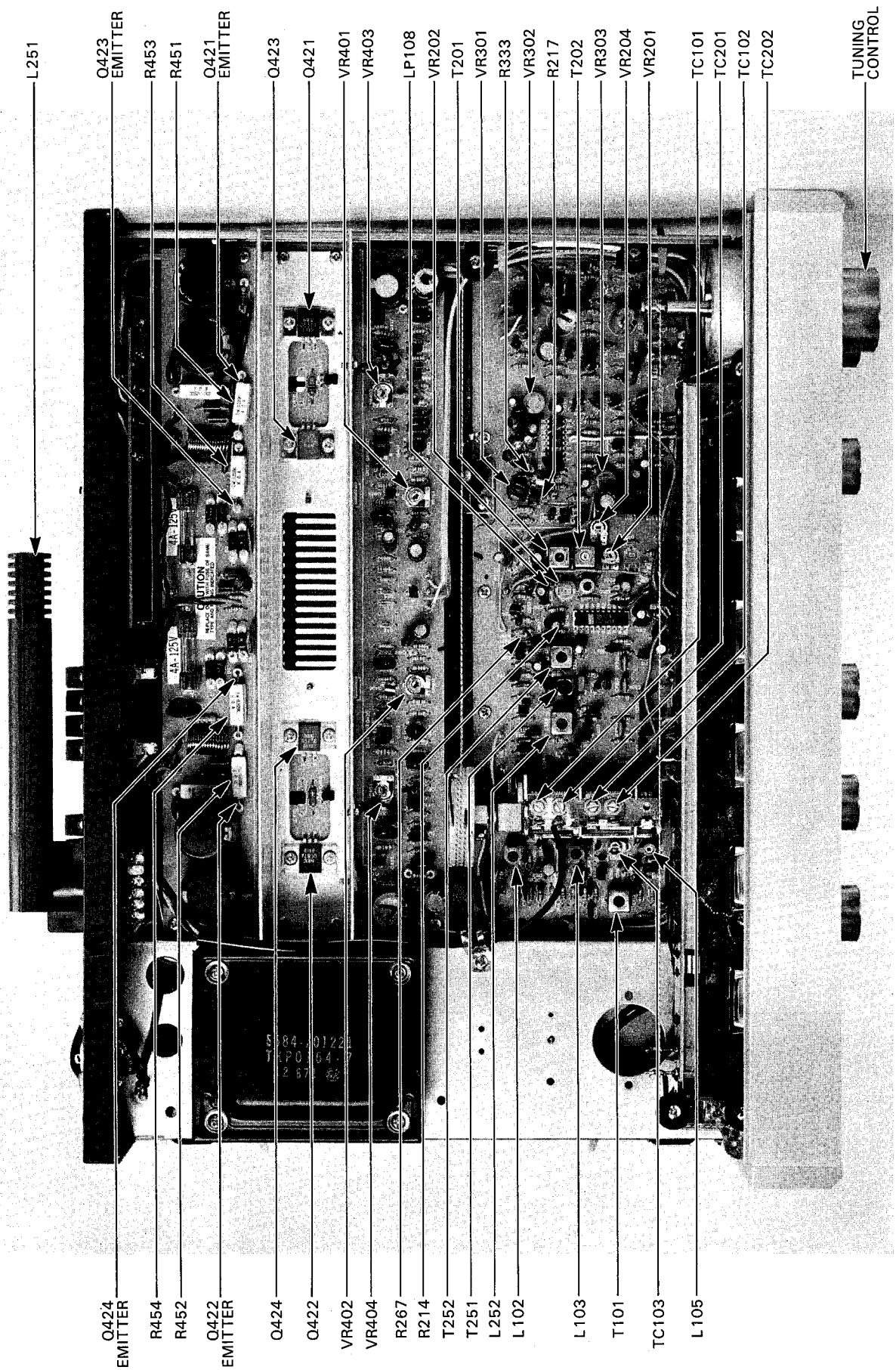
POWER AMPLIFIER IDLING ADJUSTMENT

INSTRUMENT REQUIRED: *D. C. V. T. V. M..

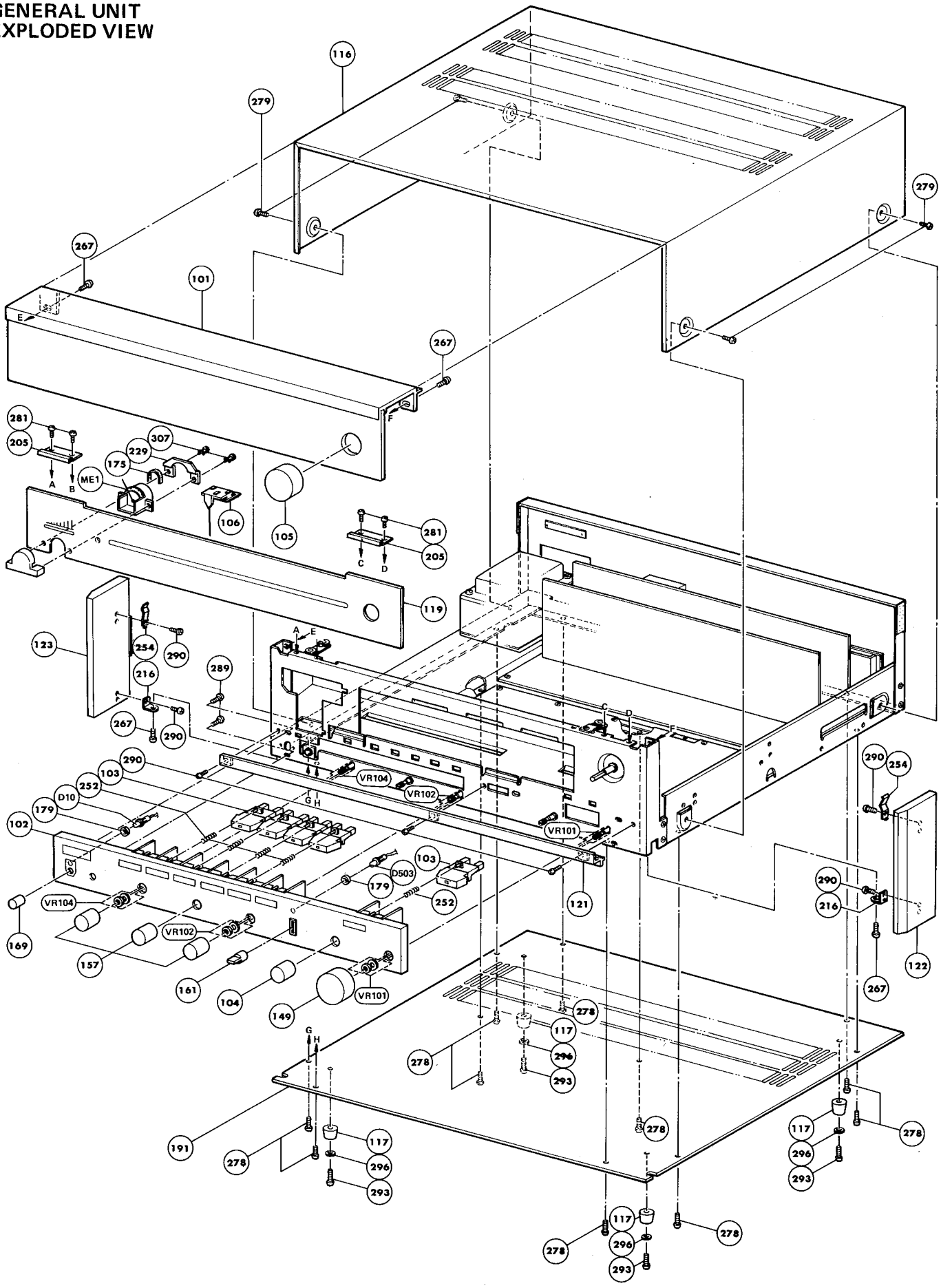
NOTE: *Set function selector switch to AUX position.
*Set volume control to minimum position.
*Adjustment to be performed with NO loads at output terminals.

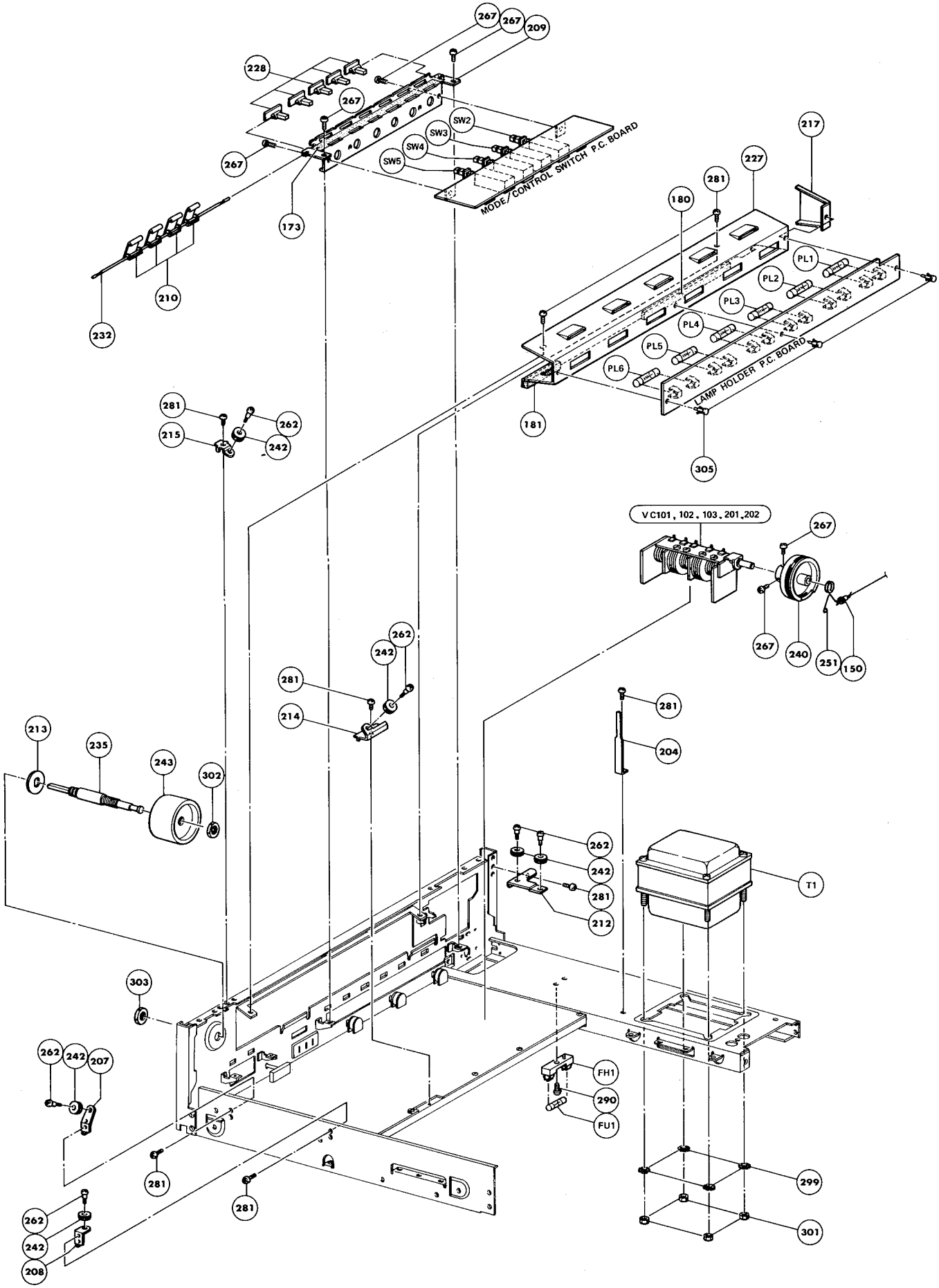
Step	CONNECT OUTPUT METER TO	ADJUST	ADJUST FOR
1	D. C. V. T. V. M. to Q421 (emitter) and Q423 (emitter)	VR403	33 mV ± 1.0 mV
2	D. C. V. T. V. M. to Q422 (emitter) and Q424 (emitter)	VR404	

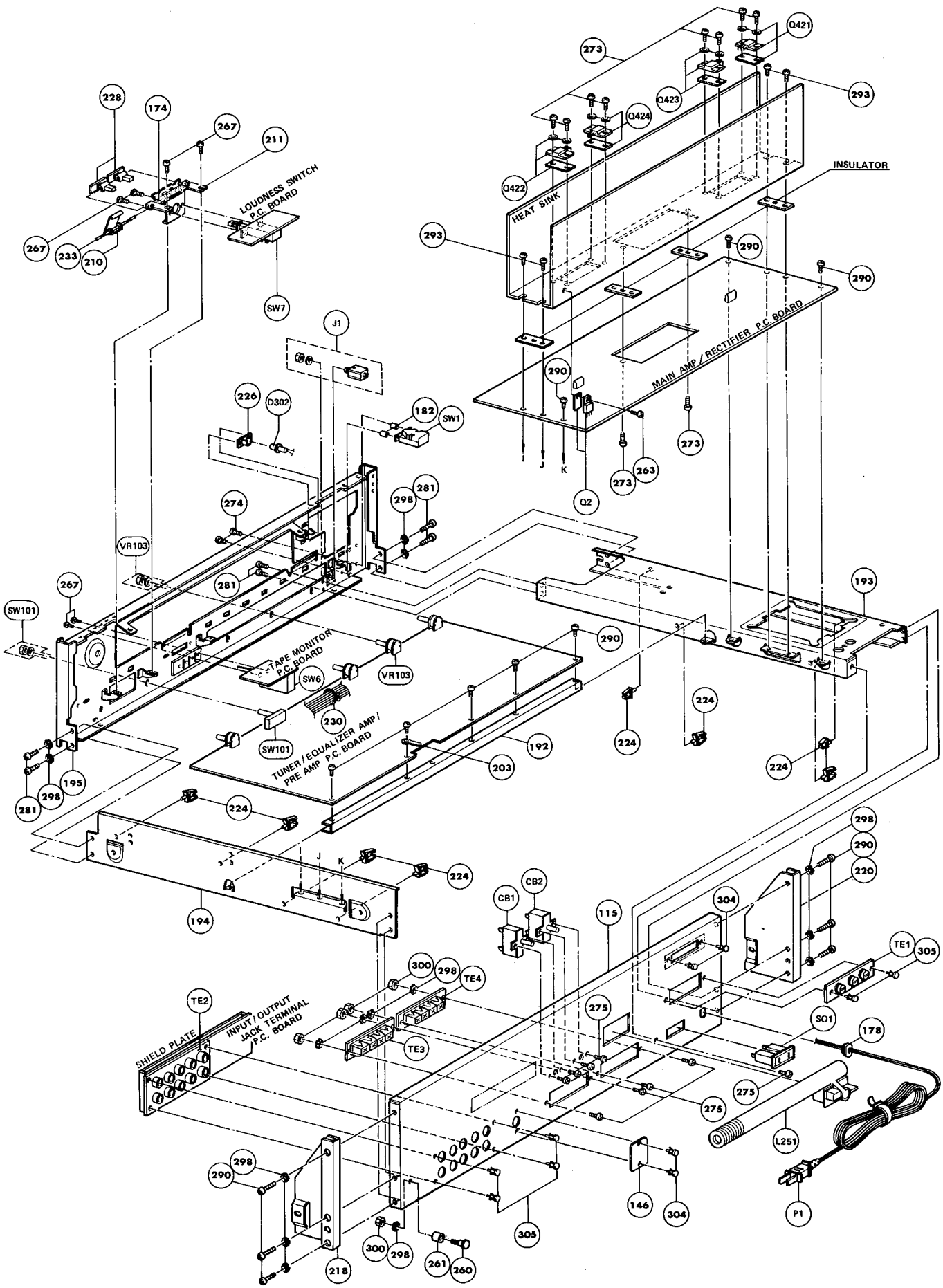
ALIGNMENT POINTS



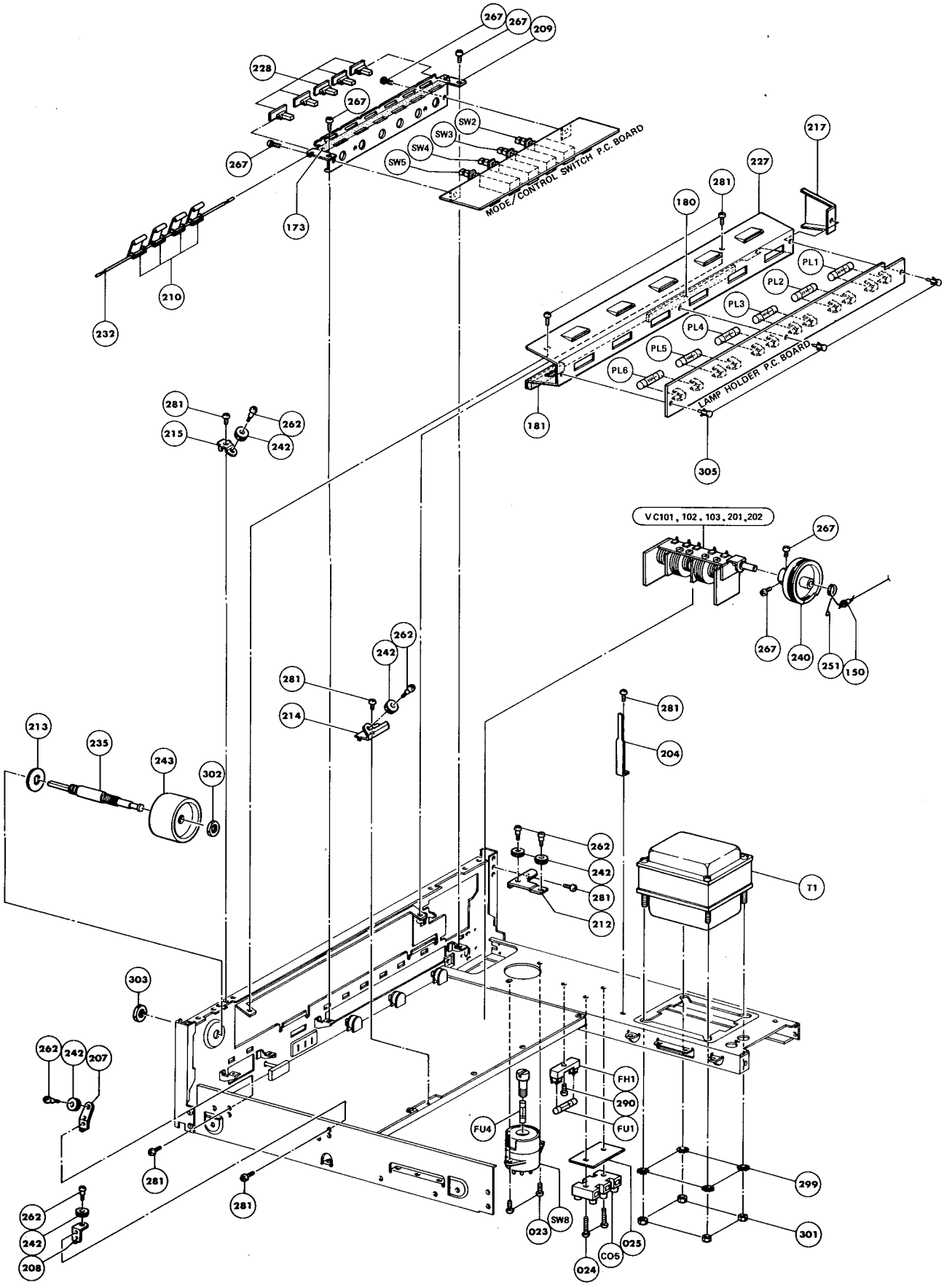
GENERAL UNIT
EXPLODED VIEW

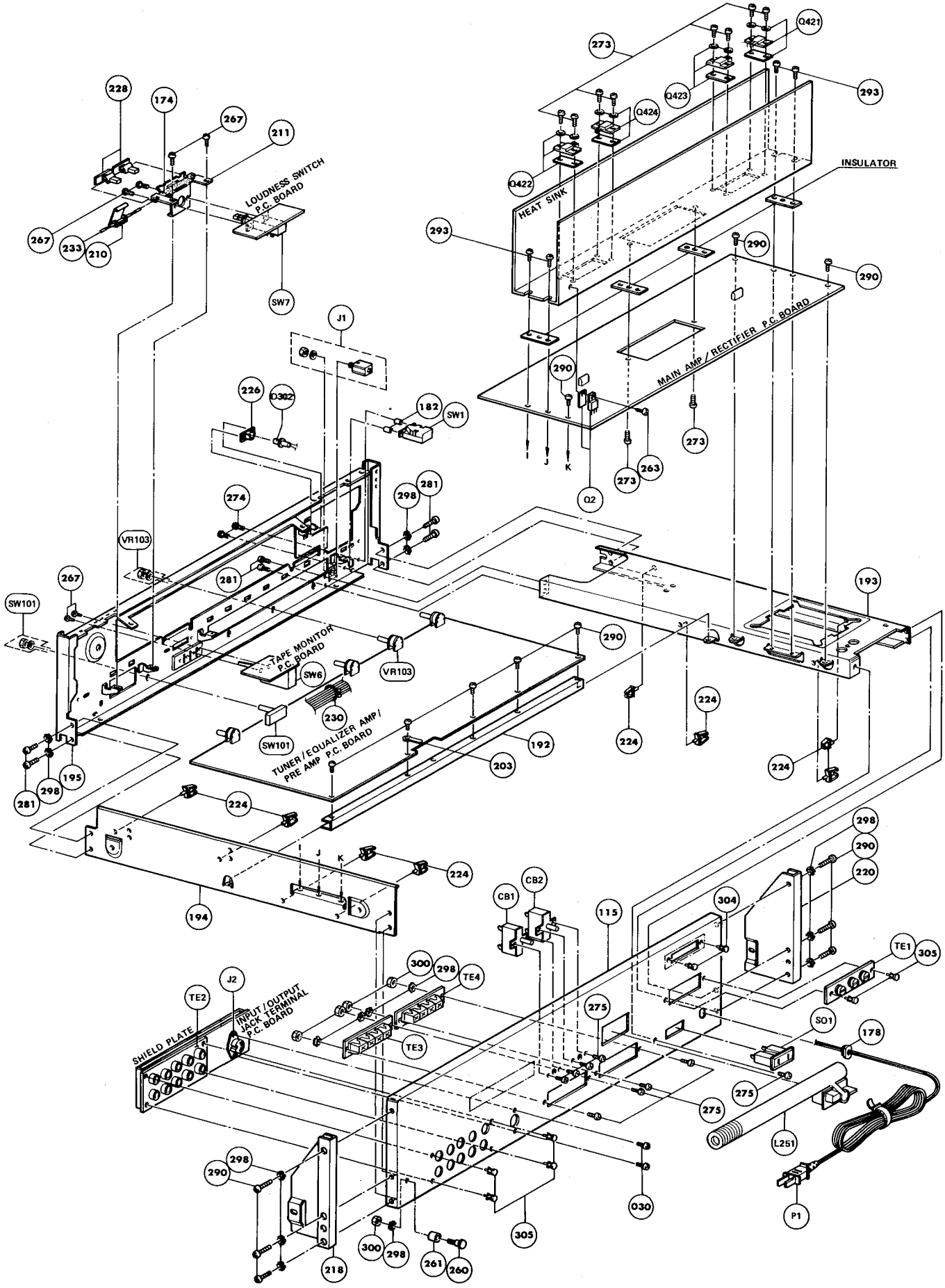



MODE/CONTROL SWITCH P.C. BOARD
LAMP HOLDER P.C. BOARD
VC101, 102, 103, 201, 202

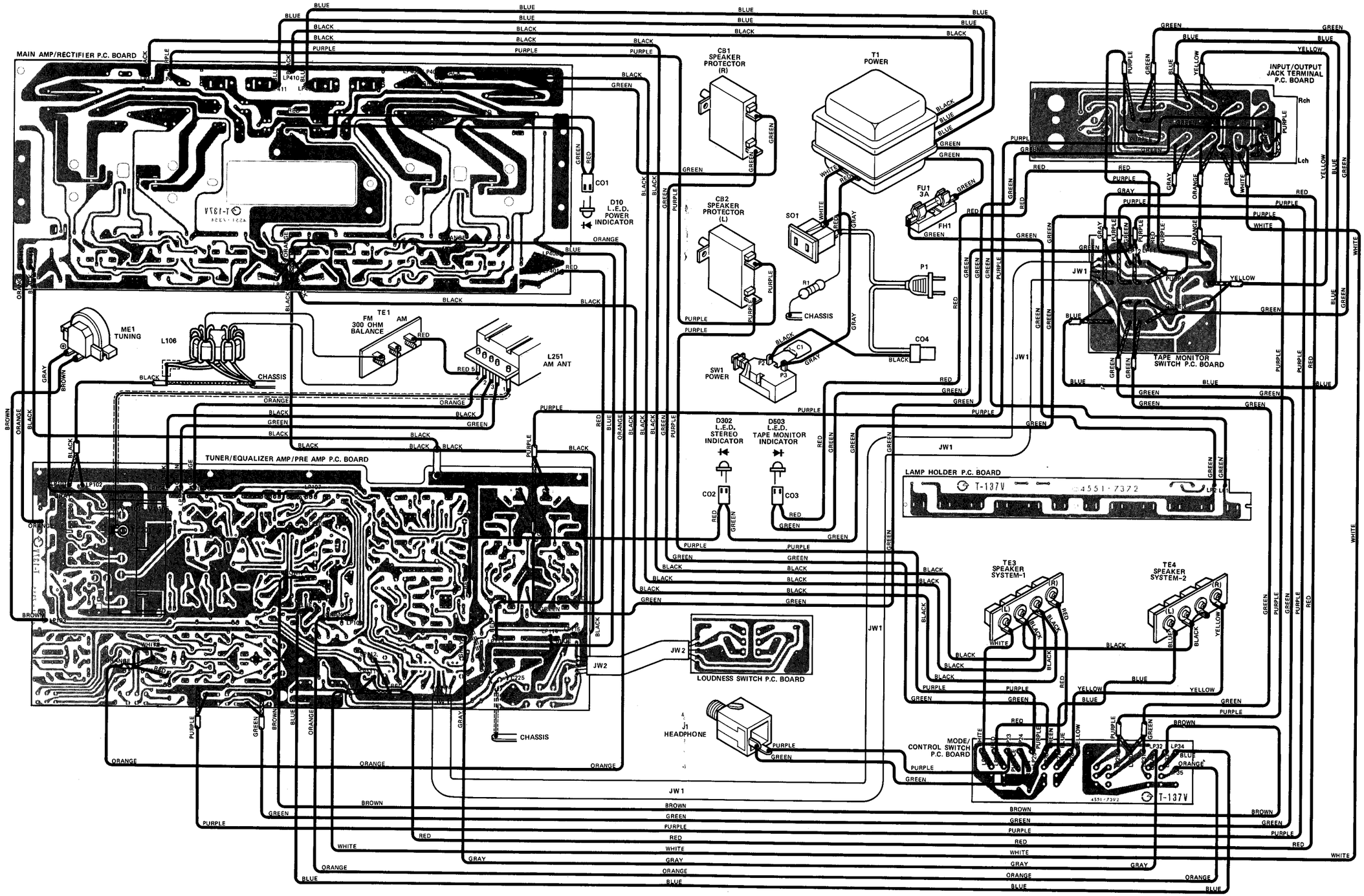

LOUDNESS SWITCH P.C. BOARD
HEAT SINK
INSULATOR
MAIN AMP / RECTIFIER P.C. BOARD
TAPE MONITOR P.C. BOARD
TUNER / EQUALIZER AMP / PRE AMP P.C. BOARD
INPUT / OUTPUT JACK TERMINAL P.C. BOARD
SHIELD PLATE
228
174
267
211
233
210
SW7
J1
226
D302
182
SW1
273
Q421
293
Q423
Q424
Q422
290
263
Q2
274
281
298
VR103
SW101
193
230
192
203
195
224
194
CB1
CB2
115
304
220
TE1
305
TE2
TE4
TE3
275
SO1
178
L251
P1
146
300
261
260
218

MULTI

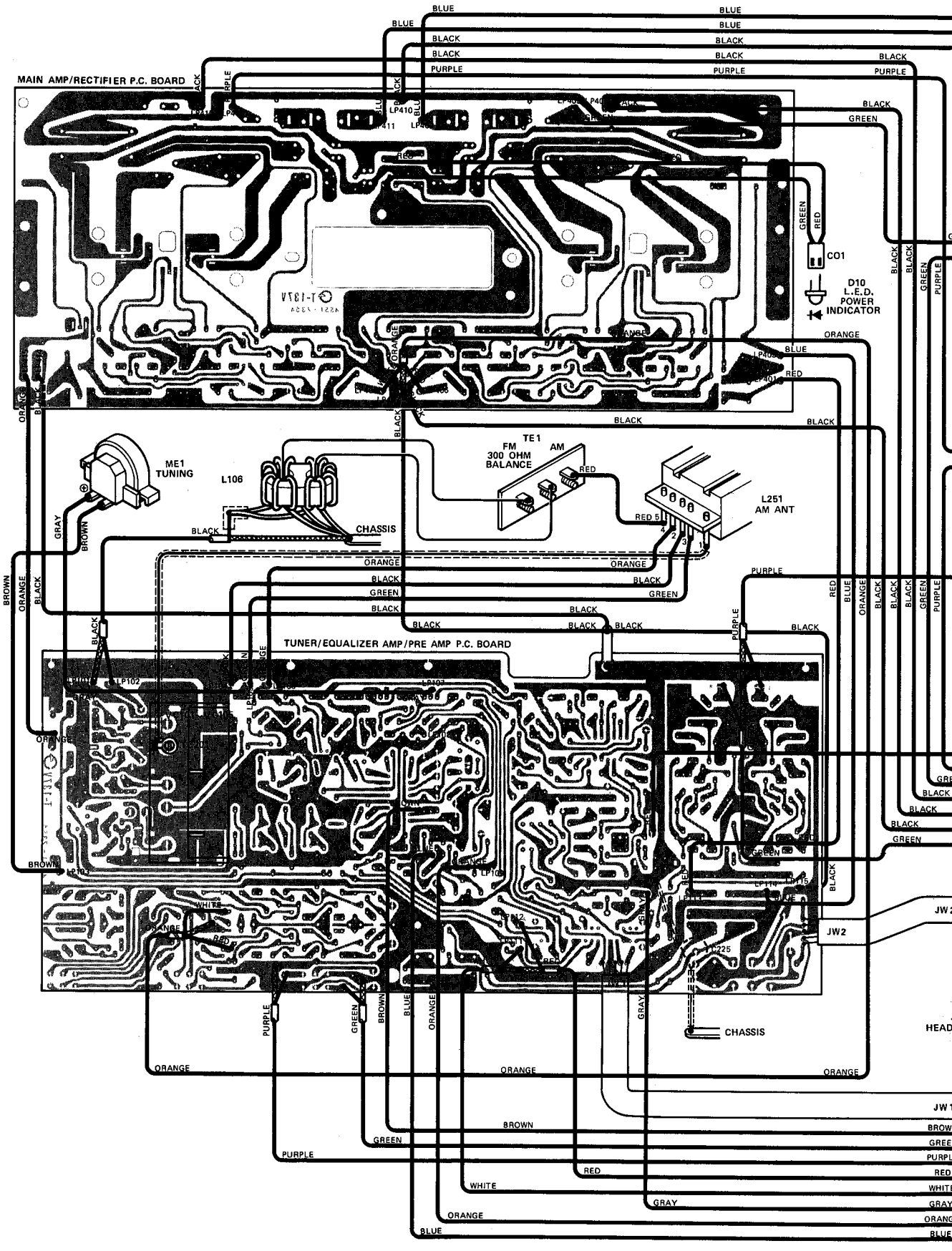

267
267
209
228
267
SW2
SW3
SW4
SW5
MODE/CONTROL SWITCH P.C. BOARD
173
210
232
217
227
281
180
PL1
PL2
PL3
PL4
PL5
PL6
LAMP HOLDER P.C. BOARD
181
305
281
215
262
242
VC101, 102, 103, 201, 202
267
267
240
251
150
262
242
281
214
281
204
213
235
243
302
262
242
281
212
T1
303
262
242
207
FH1
290
FU1
FU4
281
281
299
301
262
242
208
023
SW8
025
CO5
024

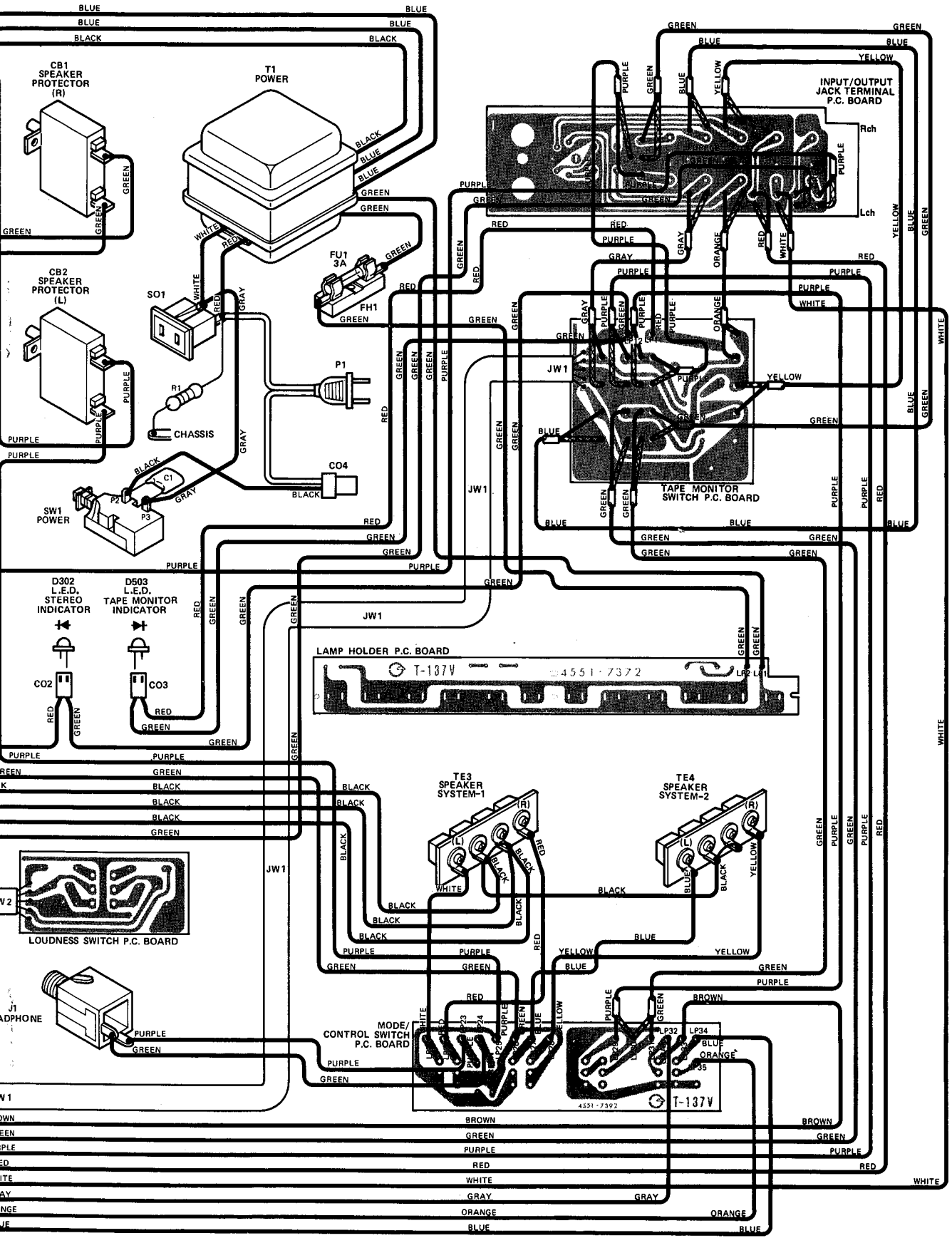

LOUDNESS SWITCH P.C. BOARD
HEAT SINK
INSULATOR
MAIN AMP / RECTIFIER P.C. BOARD
TAPE MONITOR P.C. BOARD
TUNER / EQUALIZER AMP / PRE AMP P.C. BOARD
INPUT / OUTPUT JACK TERMINAL P.C. BOARD
SHIELD PLATE
J
K

WIRING DIAGRAM

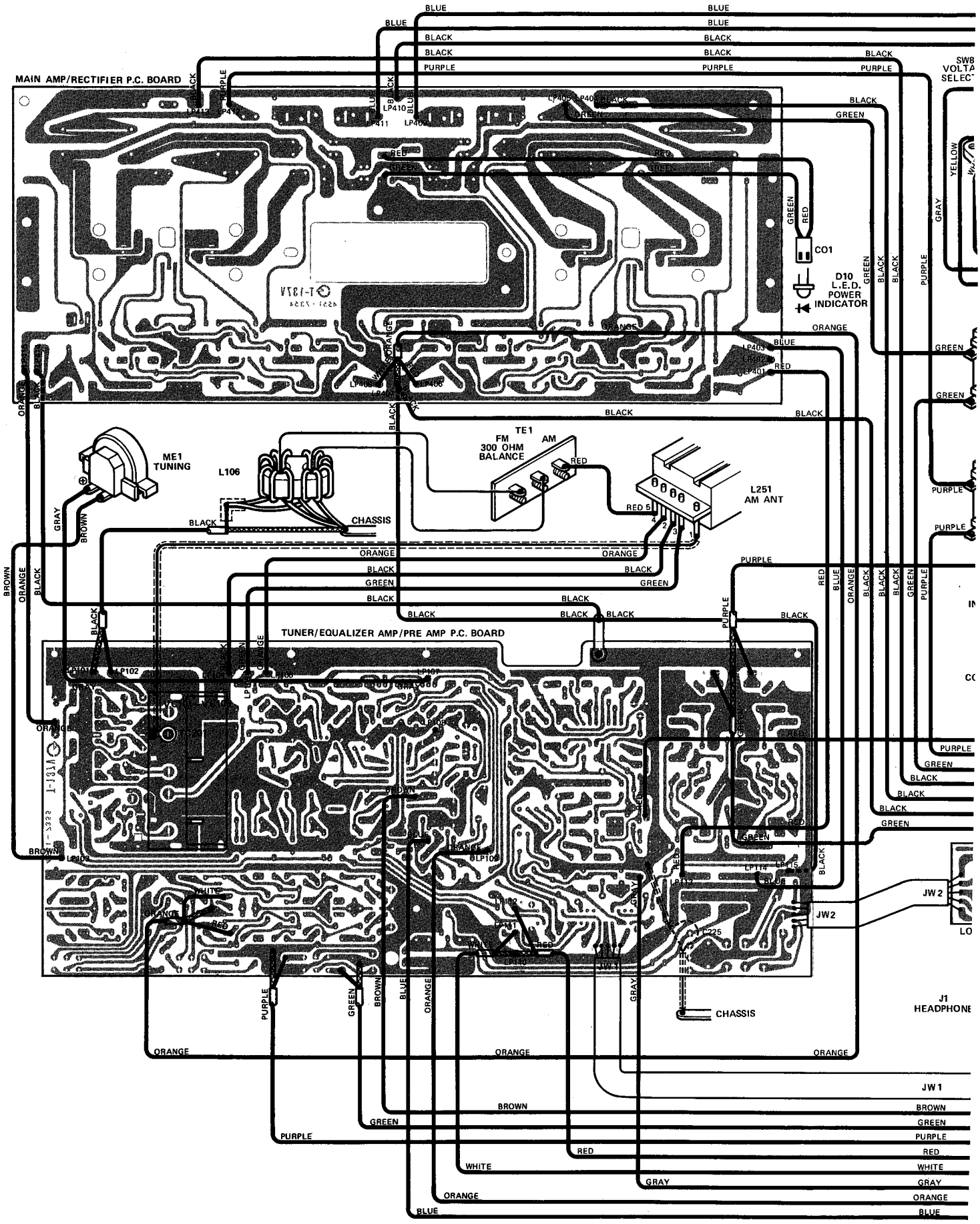


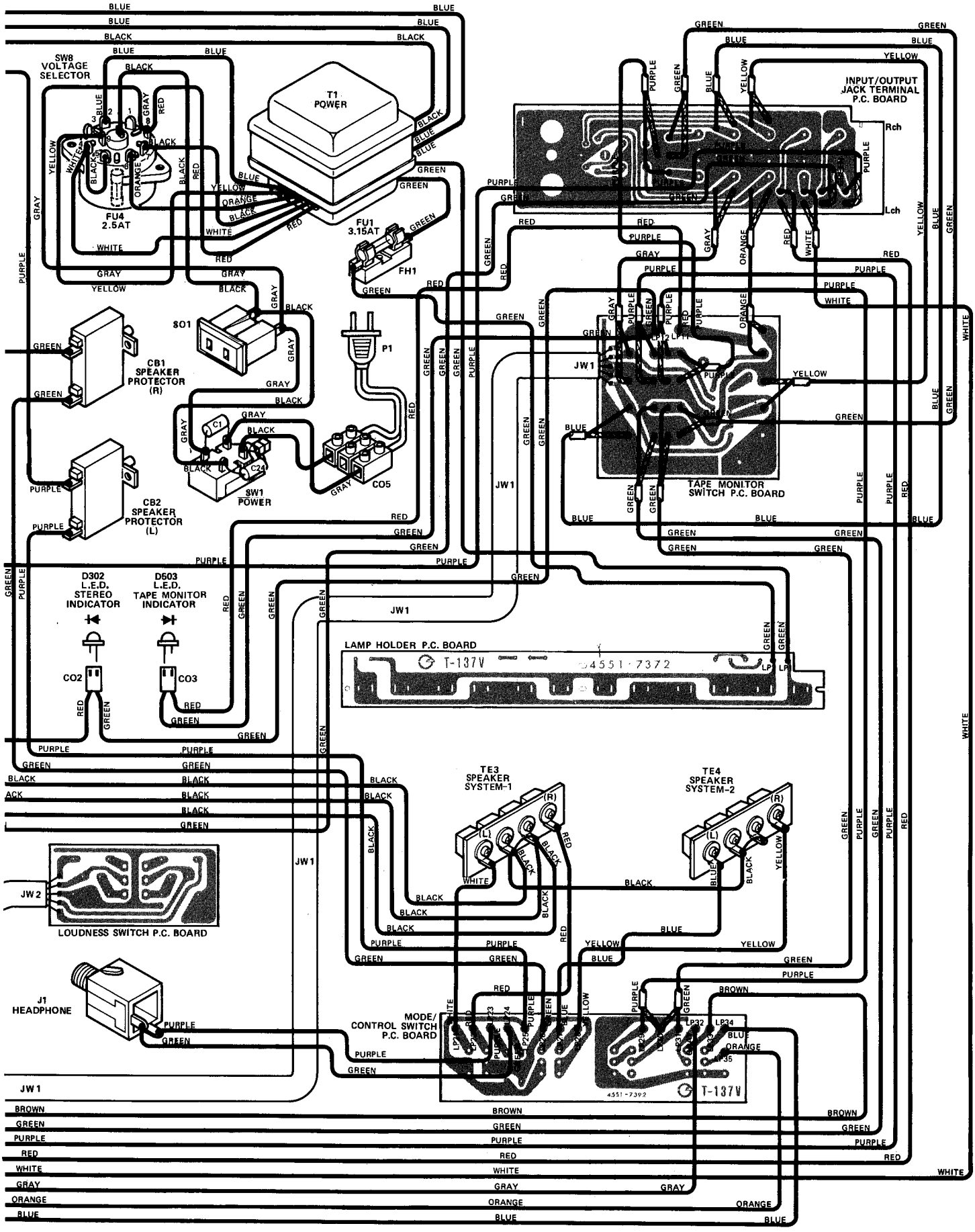
WIRING DIAGRAM



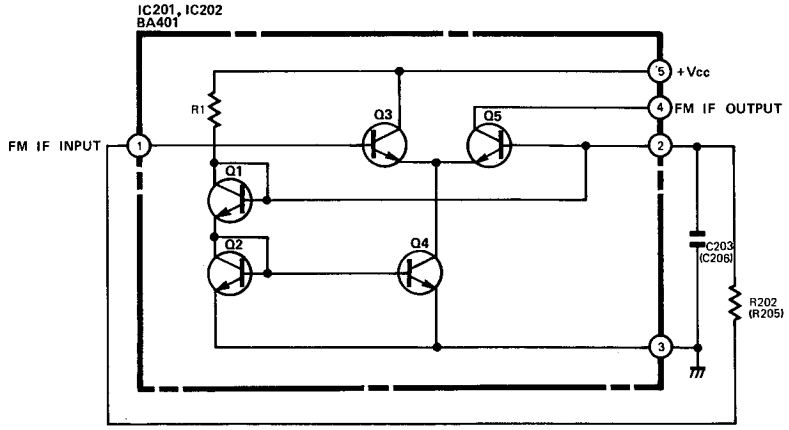

CB1
SPEAKER
PROTECTOR
(R)
T1
POWER
CB2
SPEAKER
PROTECTOR
(L)
SO1
FU1
3A
FH1
P1
R1
CHASSIS
CO4
SW1
POWER
C1
P2
P3
INPUT/OUTPUT
JACK TERMINAL
P.C. BOARD
Rch
Lch
JW1
TAPE MONITOR
SWITCH P.C. BOARD
D302
L.E.D.
STEREO
INDICATOR
D503
L.E.D.
TAPE MONITOR
INDICATOR
CO2
CO3
LAMP HOLDER P.C. BOARD
T-137V
4551-7372
TE3
SPEAKER
SYSTEM-1
TE4
SPEAKER
SYSTEM-2
LOUDNESS SWITCH P.C. BOARD
MODE/
CONTROL SWITCH
P.C. BOARD
LP32
LP34
LP35
BLUE
BLUE
BLACK
GREEN
PURPLE
RED
WHITE
GRAY
ORANGE
YELLOW
BROWN

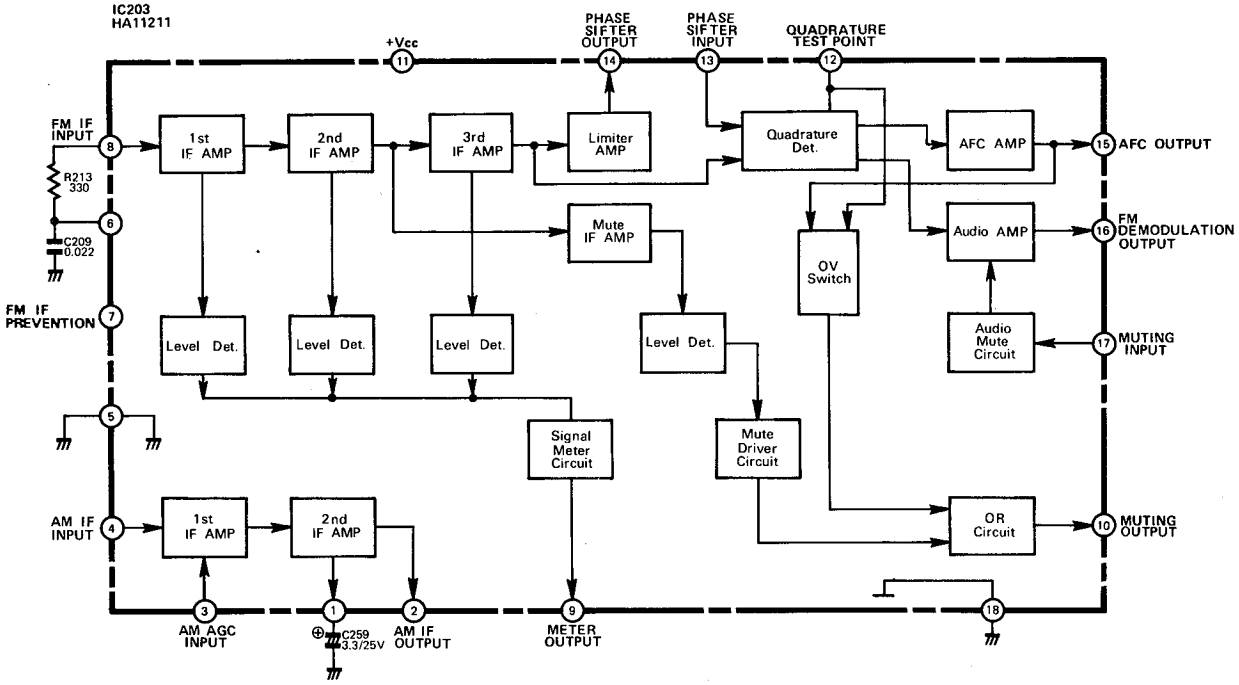
WIRING DIAGRAM MULTI

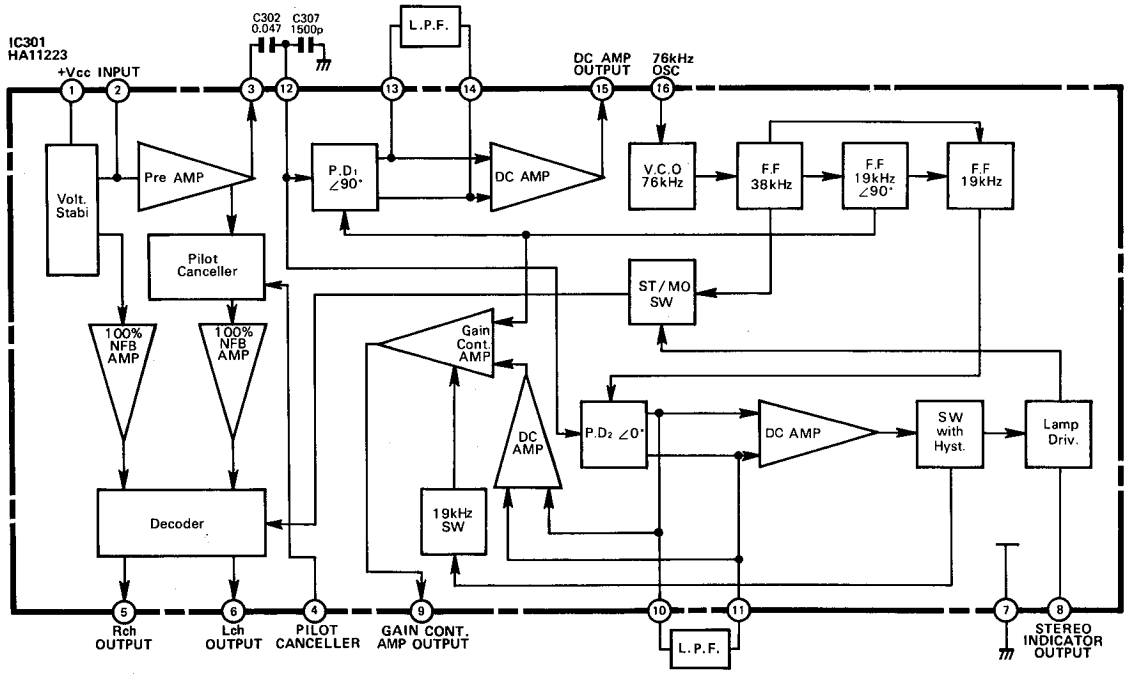



SW8
VOLTAGE
SELECTOR
T1
POWER
FU4
2.5AT
FU1
3.15AT
FH1
SO1
P1
CB1
SPEAKER
PROTECTOR
(R)
CB2
SPEAKER
PROTECTOR
(L)
SW1
POWER
CO5
D302
L.E.D.
STEREO
INDICATOR
D503
L.E.D.
TAPE MONITOR
INDICATOR
CO2
CO3
INPUT/OUTPUT
JACK TERMINAL
P.C. BOARD
Rch
Lch
JW1
TAPE MONITOR
SWITCH P.C. BOARD
LAMP HOLDER P.C. BOARD
T-137V
4551-7372
TE3
SPEAKER
SYSTEM-1
TE4
SPEAKER
SYSTEM-2
JW2
LOUDNESS SWITCH P.C. BOARD
J1
HEADPHONE
MODE/
CONTROL SWITCH
P.C. BOARD
BLUE
BLACK
GREEN
YELLOW
PURPLE
GRAY
RED
WHITE
ORANGE
BROWN

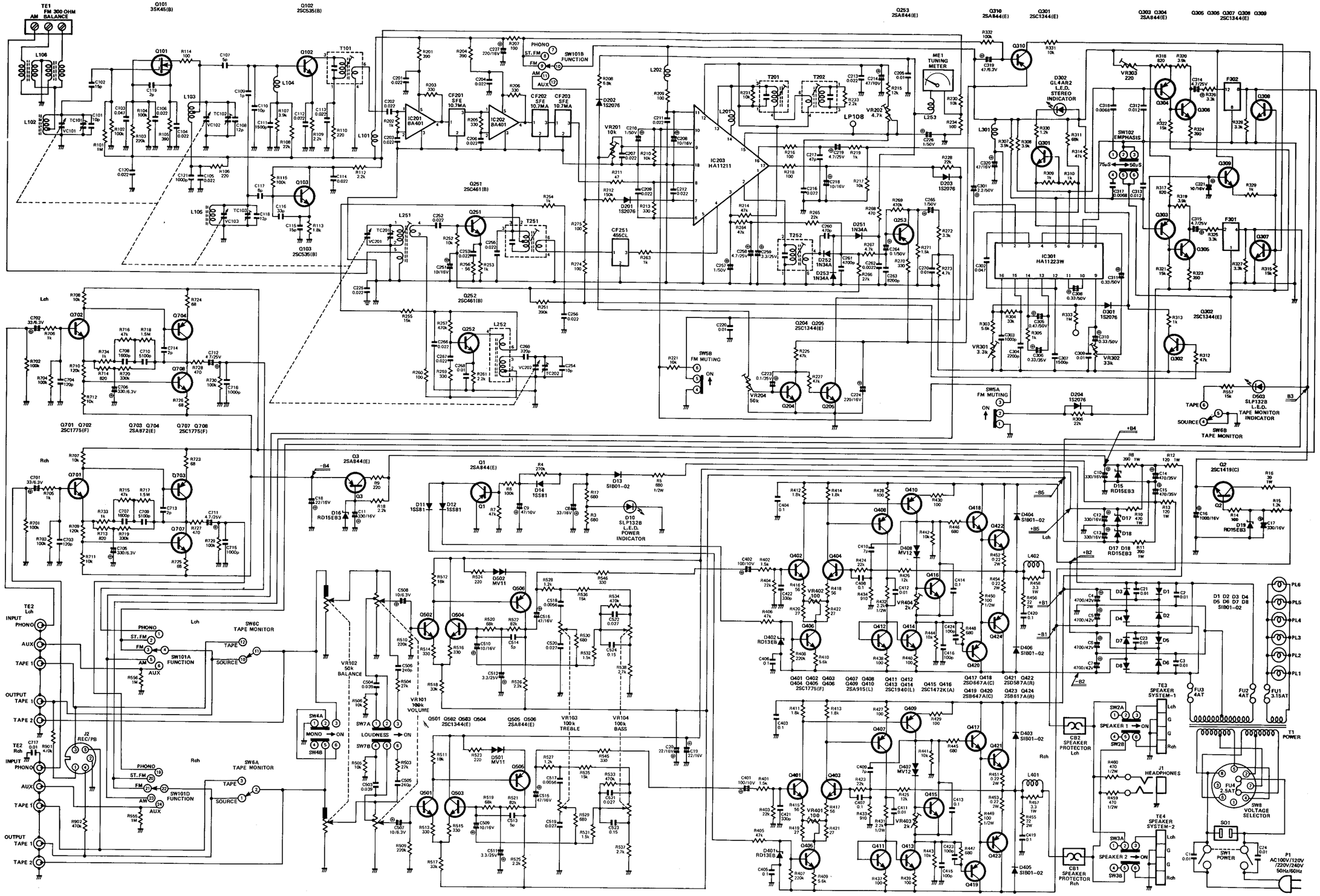
IC BLOCK DIAGRAM



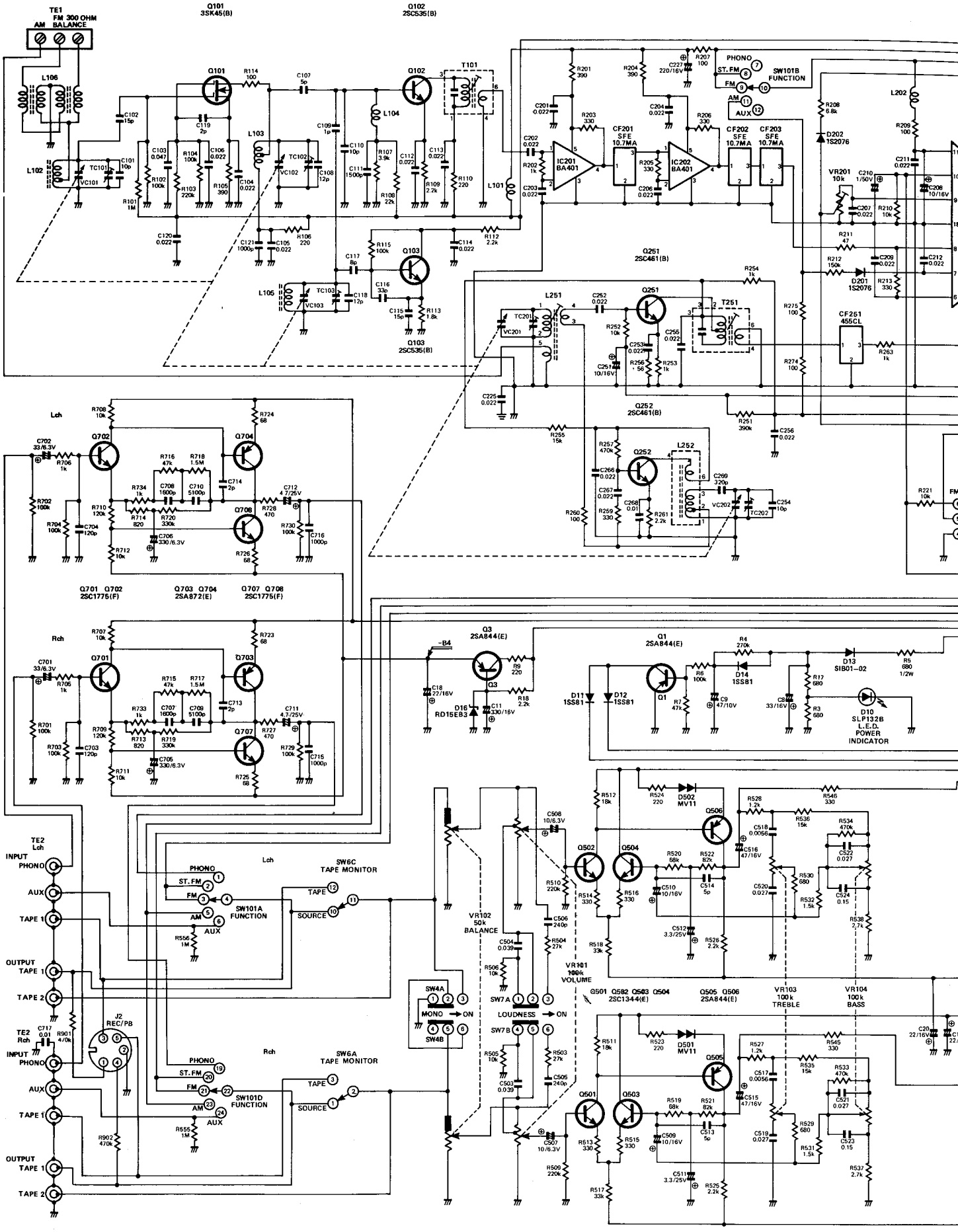


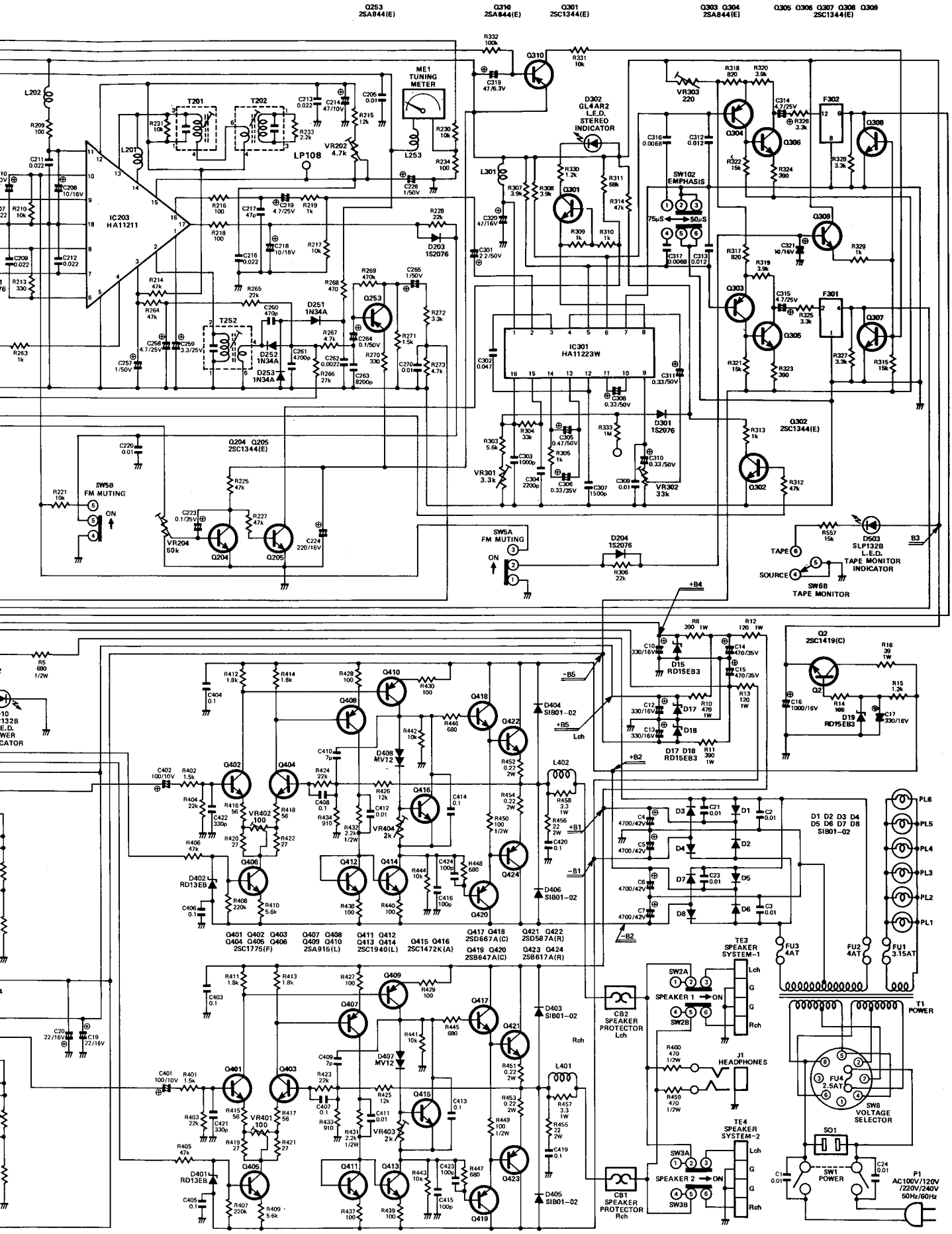


SCHEMATIC DIAGRAM MULTI

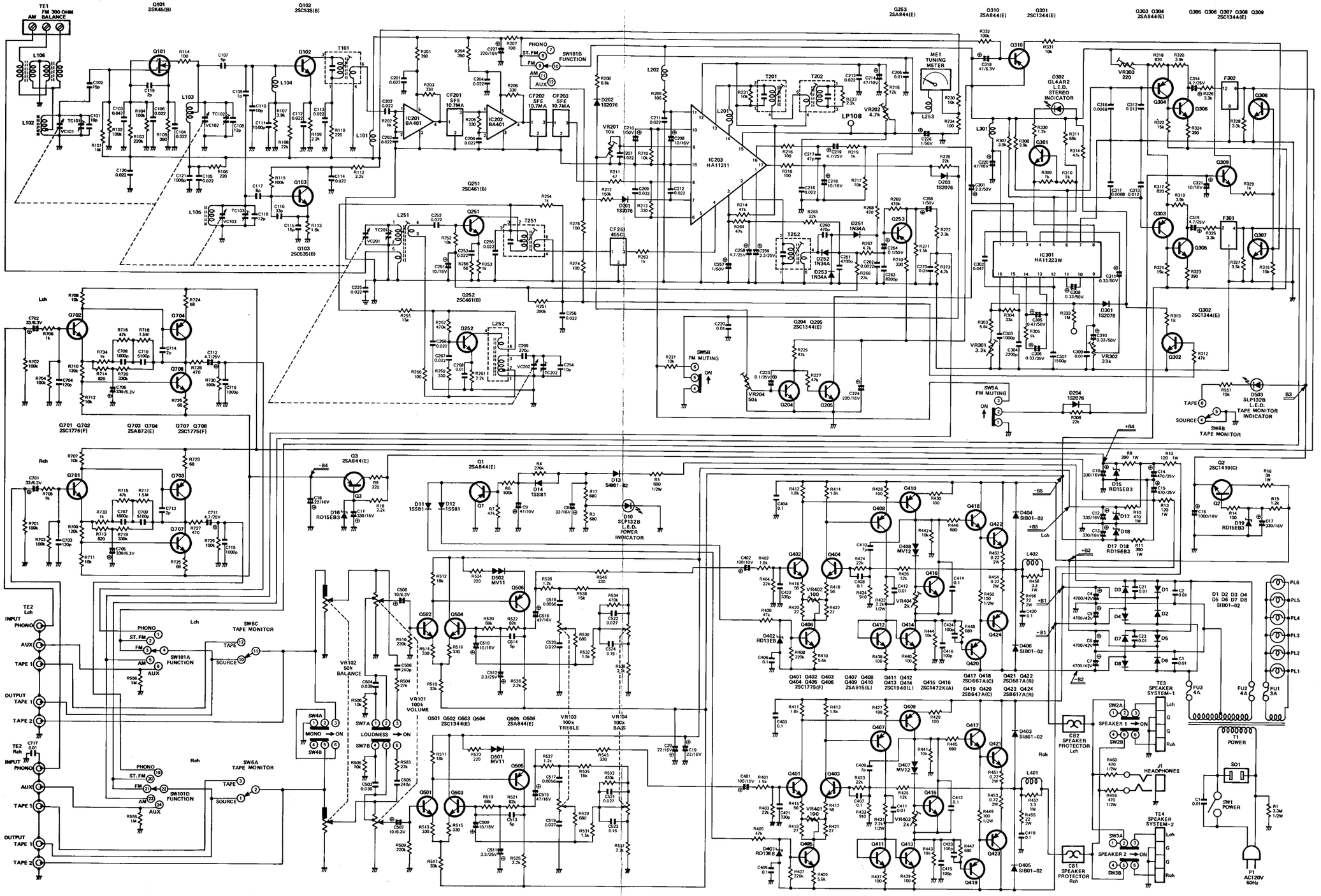


SCHEMATIC DIAGRAM MULTI

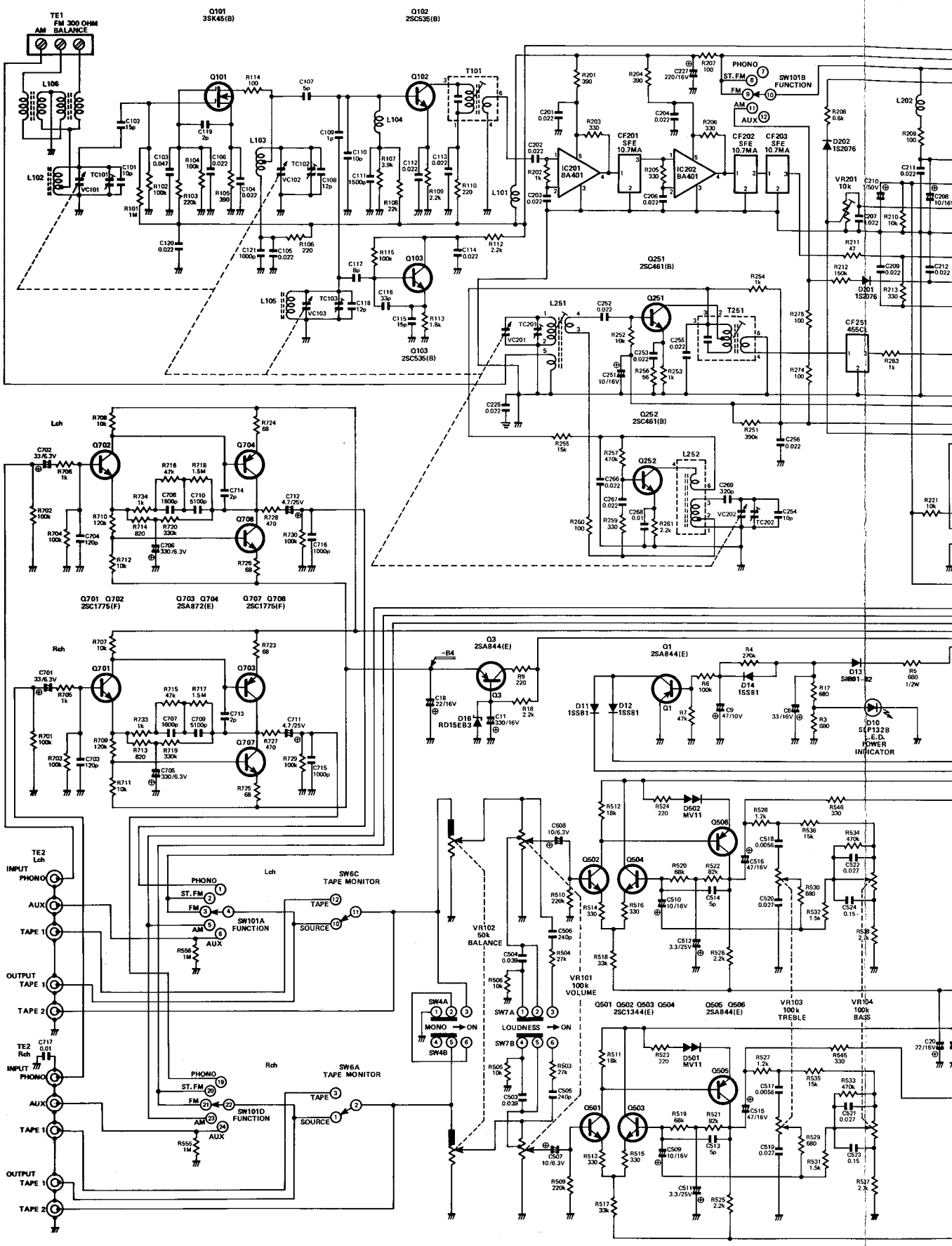


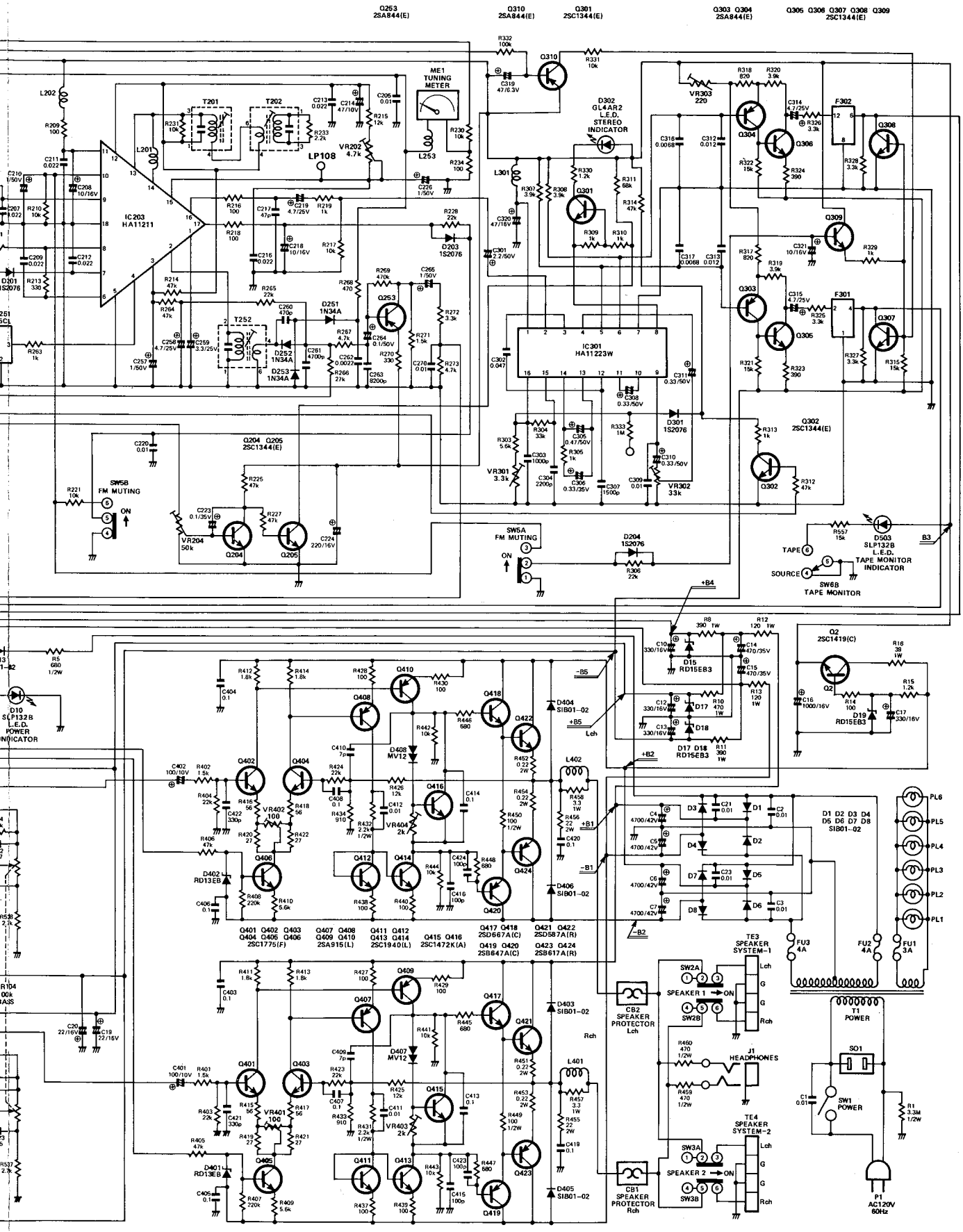

Q253 2SA844(E)
Q310 2SA844(E)
Q301 2SC1344(E)
Q303 Q304 2SA844(E)
Q305 Q306 Q307 Q308 Q309 2SC1344(E)
ME1 TUNING METER
LP108
IC203 HA11211
IC301 HA11223W
D302 GL4AR2 L.E.D. STEREO INDICATOR
SW102 EMPHASIS
75μS
50μS
D203 1S2076
D251 1N34A
D252 1N34A
D253 1N34A
D301 1S2076
D204 1S2076
D503 SLP132B L.E.D. TAPE MONITOR INDICATOR
SW6B TAPE MONITOR
SW5B FM MUTING
SW5A FM MUTING
Q204 Q205 2SC1344(E)
Q302 2SC1344(E)
VR204 50k
VR301 3.3k
VR302 33k
VR303 220
+B4
Q2 2SC1419(C)
D15 RD15EB3
D17 D18 RD15EB3
D19 RD15EB3
-B5
+B5
Lch
+B2
-B2
+B1
-B1
Q401 Q402 Q403 Q406 2SC1775(F)
Q407 Q408 Q409 Q410 2SA915(L)
Q411 Q412 Q413 Q414 2SC1940(L)
Q415 Q416 2SC1472K(A)
Q417 Q418 2SD667A(C) 2SB647A(C)
Q421 Q422 2SD587A(R) 2SB617A(R)
Q419 Q420 2SB647A(C)
Q423 Q424 2SB617A(R)
D401 RD13EB
D402 RD13EB
D403 SIB01-02
D404 SIB01-02
D405 SIB01-02
D406 SIB01-02
D408 MV12
D407 MV12
D1 D2 D3 D4 D5 D6 D7 D8 SIB01-02
L401
L402
CB1 SPEAKER PROTECTOR Rch
CB2 SPEAKER PROTECTOR Lch
SPEAKER 1 → ON
SPEAKER 2 → ON
TE3 SPEAKER SYSTEM-1
TE4 SPEAKER SYSTEM-2
J1 HEADPHONES
SW8 VOLTAGE SELECTOR
SW1 POWER
P1 AC100V/120V /220V/240V 50Hz/60Hz
FU1 3.15AT
FU2 4AT
FU3 4AT
FU4 2.5AT
T1 POWER
PL1
PL2
PL3
PL4
PL5
PL6

SCHEMATIC DIAGRAM REGULAR



SCHEMATIC DIAGRAM REGULAR




Q253 2SA844(E)
Q310 2SA844(E)
Q301 2SC1344(E)
Q303 Q304 2SA844(E)
Q305 Q306 Q307 Q308 Q309 2SC1344(E)
ME1 TUNING METER
D302 GL4AR2 L.E.D. STEREO INDICATOR
IC203 HA11211
IC301 HA11223W
LP108
T201
T202
T252
L201
L202
L253
L301
F301
F302
VR202 4.7k
VR204 50k
VR301 3.3k
VR302 33k
VR303 220
SW5A FM MUTING
SW5B FM MUTING
ON
D203 1S2076
D204 1S2076
D301 1S2076
D251 1N34A
D252 1N34A
D253 1N34A
Q204 Q205 2SC1344(E)
Q302 2SC1344(E)
D503 SLP132B L.E.D. TAPE MONITOR INDICATOR
SW6B TAPE MONITOR
TAPE
SOURCE
+B4
+B5 Lch
+B2
+B1
-B1
-B2
-B5
D10 SLP132B L.E.D. POWER INDICATOR
Q2 2SC1419(C)
D15 RD15EB3
D17 D18 RD15EB3
D19 RD15EB3
D1 D2 D3 D4 D5 D6 D7 D8 SI801-02
D401 RD13EB
D402 RD13EB
D403 SI801-02
D404 SI801-02
D405 SI801-02
D406 SI801-02
D407 MV12
D408 MV12
Q401 Q402 Q403 Q404 Q405 Q406 2SC1775(F)
Q407 Q408 Q409 Q410 2SA915(L)
Q411 Q412 Q413 Q414 2SC1940(L)
Q415 Q416 2SC1472K(A)
Q417 Q418 2SD667A(C)
Q421 Q422 2SD587A(R)
Q419 Q420 2SB647A(C)
Q423 Q424 2SB617A(R)
VR401 100
VR403 2k
VR404 2k
L401
L402
TE3 SPEAKER SYSTEM-1
TE4 SPEAKER SYSTEM-2
SW2A
SW2B
SW3A
SW3B
SPEAKER 1 ON
SPEAKER 2 ON
CB1 SPEAKER PROTECTOR Rch
CB2 SPEAKER PROTECTOR Lch
J1 HEADPHONES
T1 POWER
SW1 POWER
SO1
P1 AC120V 60Hz
FU1 3A
FU2 4A
FU3 4A
PL1
PL2
PL3
PL4
PL5
PL6

SCHEMATIC NOTES AND VOLTAGES

NOTES: Unless otherwise specified.

1. All resistors are 1/4 watt, ±5%. Values are in ohms. K=1000 M=1000k.
2. All capacitances values are in MF. PF=MMF.
3. Function selector switch (SW101) is in FM position.

VOLTAGE CHART

AC120V — Volume Control at Minimum
No Signal — Tone Controls at Mechanical Center
Chassis Ground

+B1 . . . . . +32V
-B1 . . . . . -32V
+B2 . . . . . +32V
-B2 . . . . . -32V
B3 . . . . . +14.4V

+B4 . . . . . +15V
-B4 . . . . . -14.4V
+B5 . . . . . +15V
-B5 . . . . . -15V

FM POSITION

	base	emitter	collector
Q1	-0.63V	0V	0V
Q2	+15.0V	+14.4V	+29.0V
Q3	-15.0V	-14.4V	-25.0V
Q102	+1.8V	+1.3V	+12.3V
Q103	+4.5V	+4.0V	+7.4V
Q204	0V	0V	+7.1V
Q205	+0.66V	0V	+0.05V
Q301	+0.05V	0V	+12.4V
Q302	+0.13V	0V	+13.5V
Q303, 304	+10.0V	+11.6V	-12.4V
Q305, 306	-12.4V	-13.0V	-2.5V
Q307, 308	+2.4V	0V	0V
Q309	0V	-0.6V	+13.6V
Q310	+13.5V	+13.6V	+0.13V
Q401, 402	-0.03V	-0.62V	+30.0V
Q403, 404	-0.03V	-0.62V	+30.0V
Q405, 406	-19.4V	-20.0V	-0.7V
Q407, 408	+30.0V	+30.6V	-8.0V
Q409, 410	+30.0V	+30.6V	+1.2V
Q411, 412	-30.0V	-30.6V	-30.0V
Q413, 414	-30.0V	-30.6V	-1.2V
Q415, 416	-0.5V	-1.2V	+1.2V
Q417, 418	+1.15V	+0.6V	+32.0V
Q419, 420	-1.15V	-0.6V	-32.0V
Q421, 422	+0.6V	+0.016V	+32.0V
Q423, 424	-0.6V	-0.016V	-32.0V
Q501, 502	0V	-0.6V	+11.0V
Q503, 504	0V	-0.6V	+15.0V
Q505, 506	+11.0V	+11.6V	0V
Q701, 702	0V	-0.6V	+13.5V
Q703, 704	+13.5V	+14.1V	-1.0V
Q707, 708	-12.9V	-13.5V	-1.0V

	drain	source	gate 1	gate 2
Q101	+10.9V	+1.8V	+1.1V	+3.8V

AM POSITION

	base	emitter	collector
Q251	+0.93V	+0.33V	+12.7V
Q252	+1.8V	+1.2V	+4.6V
Q253	+11.0V	+11.6V	+6.5V

IC201

1. . . . . +1.4V
2. . . . . +1.4V
3. . . . . 0V
4. . . . . +9.5V
5. . . . . +10.0V

IC202

1. . . . . +1.3V
2. . . . . +1.3V
3. . . . . 0V
4. . . . . +9.5V
5. . . . . +10.0V

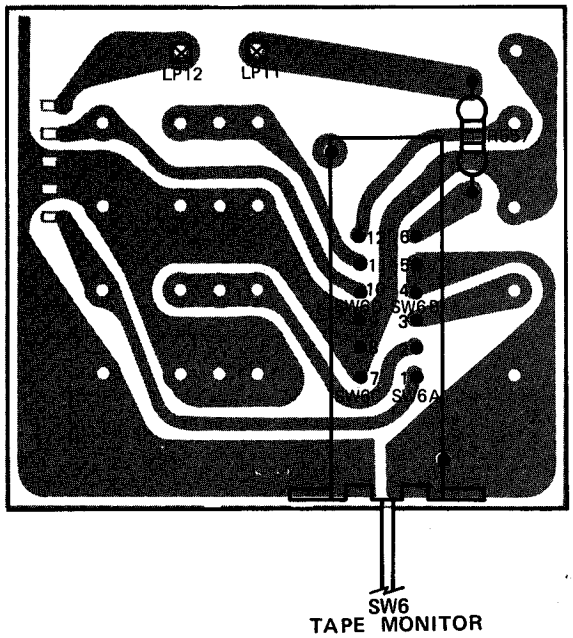
IC301

1. . . . . +13.8V
2. . . . . +3.5V
3. . . . . +4.8V
4. . . . . +0.7V
5. . . . . +10.0V
6. . . . . +10.0V
7. . . . . 0V
8. . . . . 0V
9. . . . . +5.5V
10. . . . . +2.7V
11. . . . . +2.7V
12. . . . . +2.7V
13. . . . . +2.7V
14. . . . . +2.7V
15. . . . . +4.3V
16. . . . . +3.0V

IC203

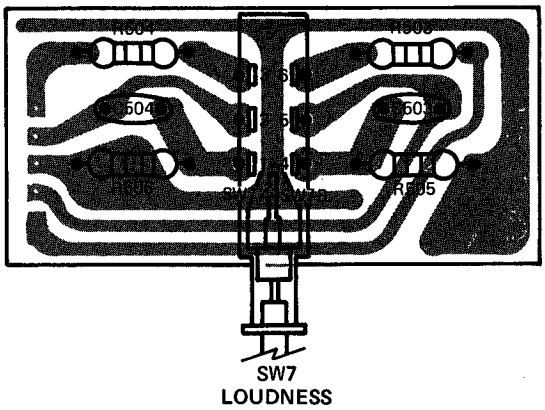
	FM	AM
1.	+2.6V	+2.6V
2.	0V	0V
3.	+3.4V	+3.4V
4.	+0.7V	+0.7V
5.	0V	0V
6.	+2.0V	+2.7V
7.	+2.0V	+2.7V
8.	+2.0V	+2.7V
9.	0V	0V
10.	+5.0V	+5.2V
11.	+11.8V	+11.7V
12.	+5.6V	+5.6V
13.	+5.6V	+5.6V
14.	+5.6V	+5.6V
15.	+7.4V	+6.5V
16.	+7.4V	+6.6V
17.	0V	0V
18.	0V	0V

TAPE COPY/TAPE MONITOR SWITCH PC BOARD



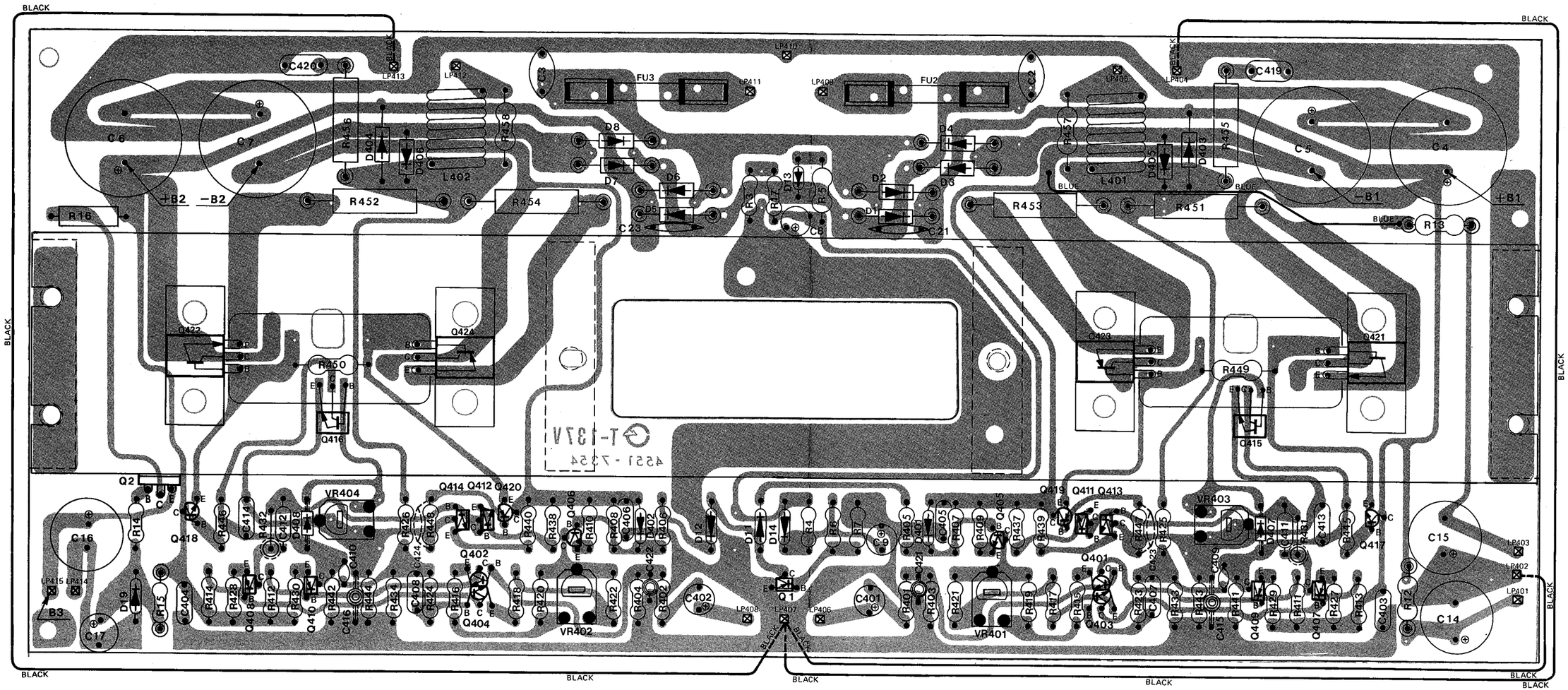
CIRCUIT REF.	H/K PART NO.	DESCRIPTION
LEVER SWITCH		
SW8	26535632	Tape Copy
SW9	26535669	Tape Monitor

LOUDNESS SWITCH PC BOARD



CIRCUIT REF.	H/K PART NO.	DESCRIPTION
SWITCH PUSHBUTTON		
SW10	25035633	Push Switch, Loudness

MAIN AMP/RECTIFIER PC BOARD

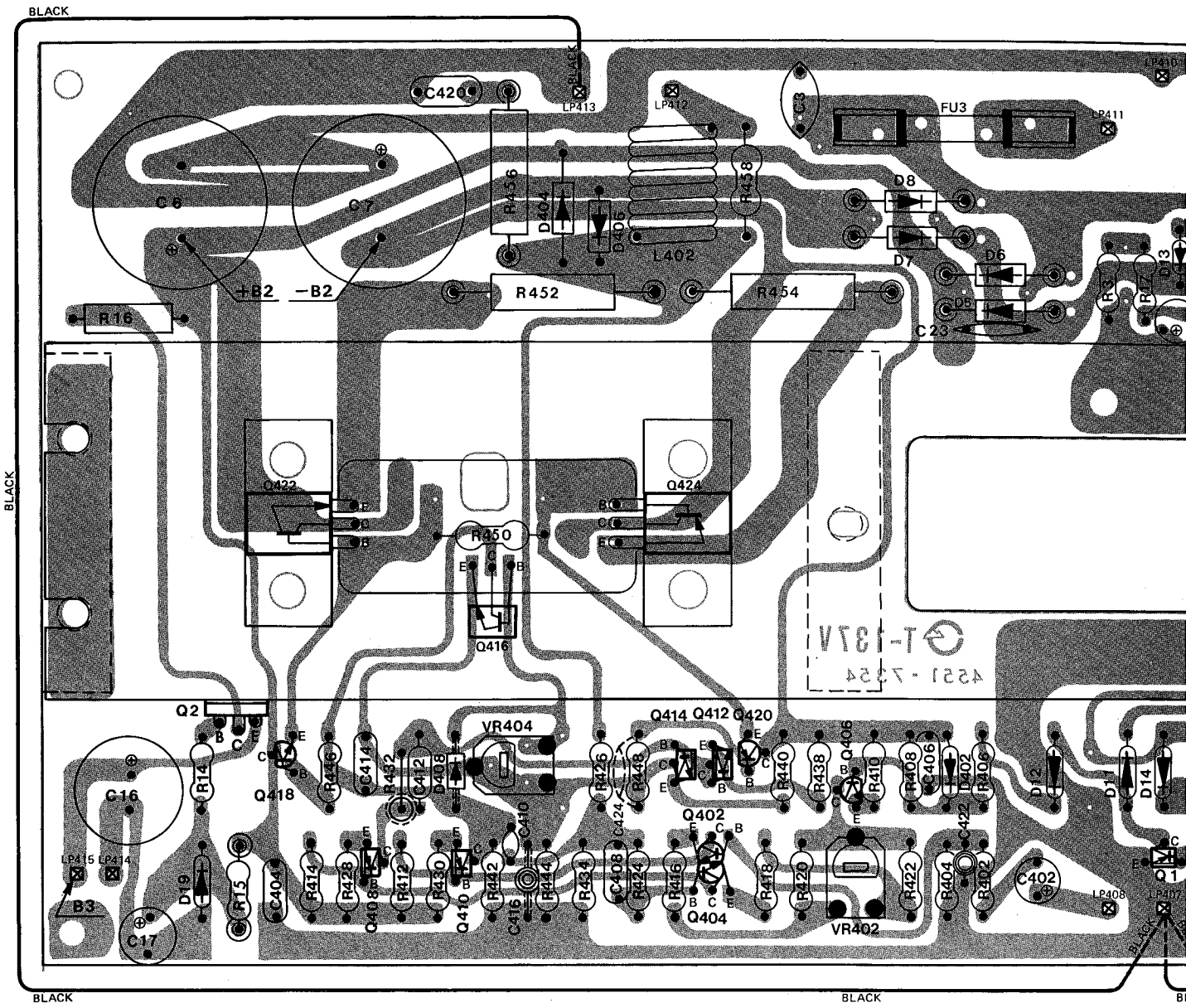


CIRCUIT REF.	H/K PART NO.	DESCRIPTION
RESISTORS		
VR401, 402	23535613	Variable Resistor, 100 ohm
VR403, 404	23535614	Variable Resistor, 2 k ohm
CAPACITORS, ELECTROLYTIC		
C4, 5, 6, 7	31535615	4700MF +30% –10% 42V
C8	31835616	33MF +50% –10% 16V
C9	31835575	47MF +50% –10% 10V
C14,15	31835617	470MF +50% –10% 35V
C16	31835618	1000MF +50% –10% 16V
C17	31835571	330MF +50% –10% 16V
C401, 402	31835619	100MF +50% –10% 10V

CIRCUIT REF.	H/K PART NO.	DESCRIPTION
TRANSISTOR		
Q1	43031312	2SA844(E) Audio Muting
Q2	43035620	2SC1419(C) Voltage Regulator
Q401, 402	43035592	2SC1775(F) Differential Amp.,
403, 404, 405, 406		Current Regulator
Q407, 408, 409, 410	43035621	2SA915(L) Differential Amp.
Q411, 412, 413, 414	43035622	2SC1940(L) Current Regulator
Q415, 416	43035623	2SC1472K(A) Bias Stabilization
Q417, 418	43035624	2SD667A(C) Driver
Q419, 420	43035625	2SB647A(C) Driver
Q421, 422	43035626	2SD587A(R) Power Amp.
Q423, 424	43035627	2SB617A(R) Power Amp.
D1, 2, 3, 4, 5, 6	41631295	Diode, SIB01
7, 8, 13		

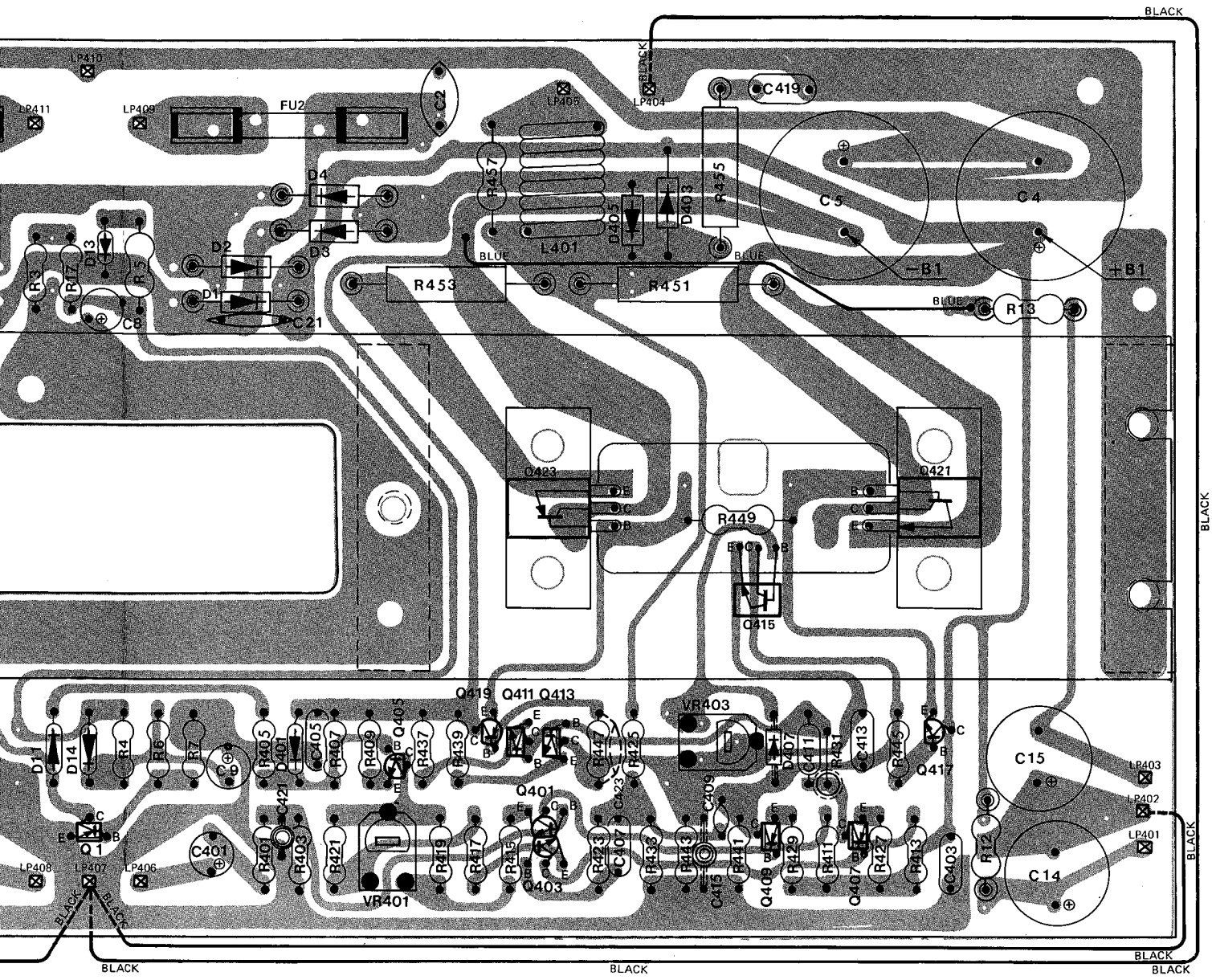
CIRCUIT REF.	H/K PART NO.	DESCRIPTION
D11, 12, 14	41035628	Diode, ISS81
D19	42035595	Zener Diode, RD15EB3 14.72V ±0.37V
D401, 402	42032760	Zener Diode, RD13EB 13.2V ±0.8V
D403, 404, 405, 406	41631295	Diode, SIB01-02
D407, 408	41035629	Varistor, MV12
COIL		
L401, 402	12035630	RF Choke

MAIN AMP/RECTIFIER PC BOARD



CIRCUIT REF.	H/K PART NO.	DESCRIPTION
RESISTORS		
VR401, 402	23535613	Variable Resistor, 100 ohm
VR403, 404	23535614	Variable Resistor, 2 k ohm
CAPACITORS, ELECTROLYTIC		
C4, 5, 6, 7	31535615	4700MF +30% −10% 42V
C8	31835616	33MF +50% −10% 16V
C9	31835575	47MF +50% −10% 10V
C14,15	31835617	470MF +50% −10% 35V
C16	31835618	1000MF +50% −10% 16V
C17	31835571	330MF +50% −10% 16V
C401, 402	31835619	100MF +50% −10% 10V

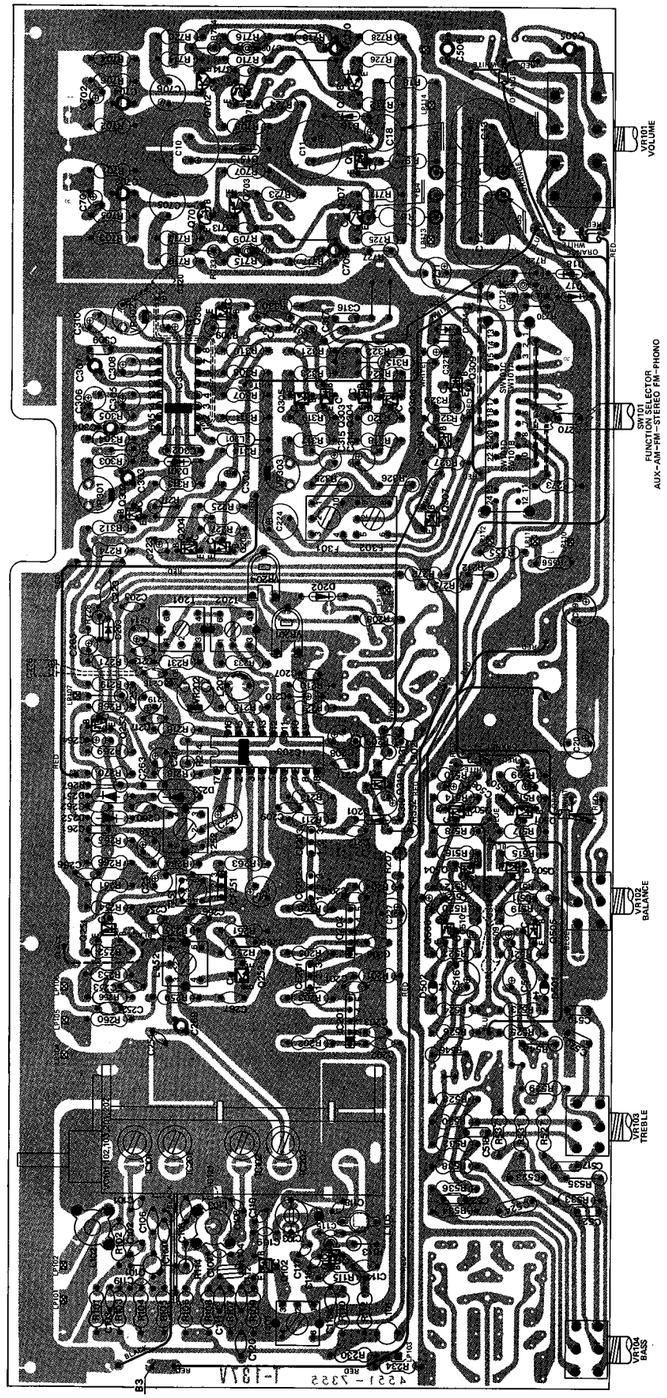
CIRCUIT REF.	H/K PART NO.
TRANSISTOR	
Q1	43031312
Q2	43035620
Q401, 402	43035592
403, 404, 405, 406	
Q407, 408, 409, 410	43035621
Q411, 412, 413, 414	43035622
Q415, 416	43035623
Q417, 418	43035624
Q419, 420	43035625
Q421, 422	43035626
Q423, 424	43035627
D1, 2, 3, 4, 5, 6	41631295
7, 8, 13	



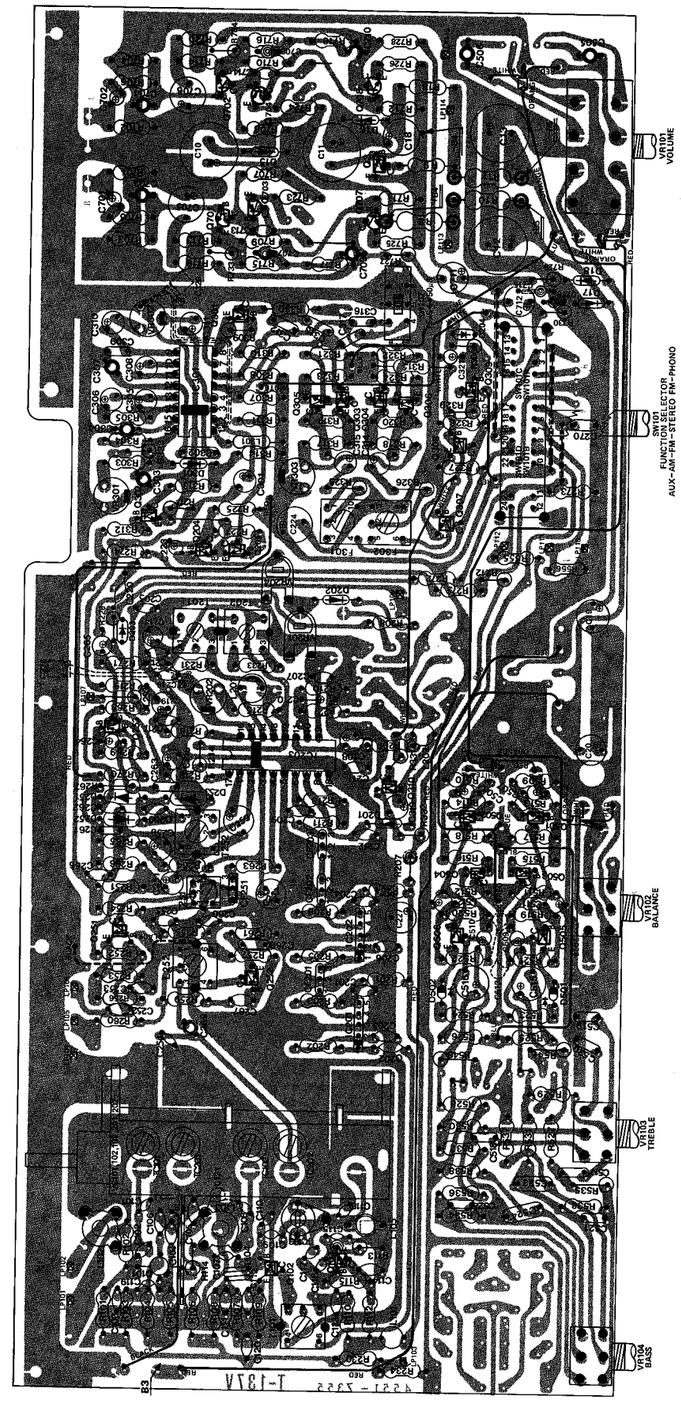
PART NO.	DESCRIPTION
312	2SA844(E) Audio Muting
5620	2SC1419(C) Voltage Regulator
5592	2SC1775(F) Differential Amp., Current Regulator
5621	2SA915(L) Differential Amp.
5622	2SC1940(L) Current Regulator
5623	2SC1472K(A) Bias Stabilization
5624	2SD667A(C) Driver
5625	2SB647A(C) Driver
5626	2SD587A(R) Power Amp.
5627	2SB617A(R) Power Amp.
1295	Diode, SIB01

CIRCUIT REF.	H/K PART NO.	DESCRIPTION
D11, 12, 14	41035628	Diode, ISS81
D19	42035595	Zener Diode, RD15EB3 14.72V ±0.37V
D401, 402	42032760	Zener Diode, RD13EB 13.2V ±0.8V
D403, 404, 405, 406	41631295	Diode, SIB01-02
D407, 408	41035629	Varistor, MV12
COIL		
L401, 402	12035630	RF Choke

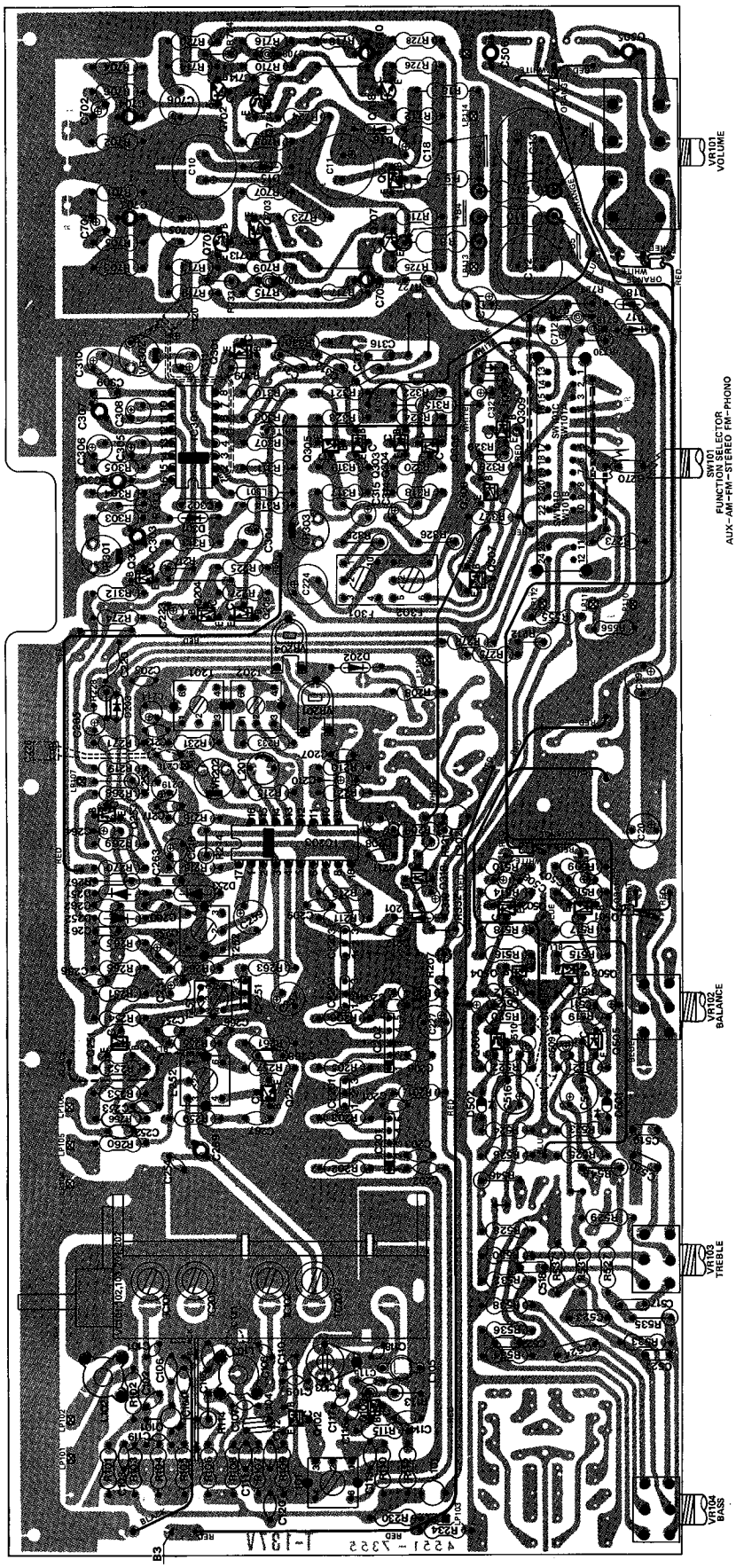
TUNER/EQUALIZER AMP/PRE AMP PC BOARD



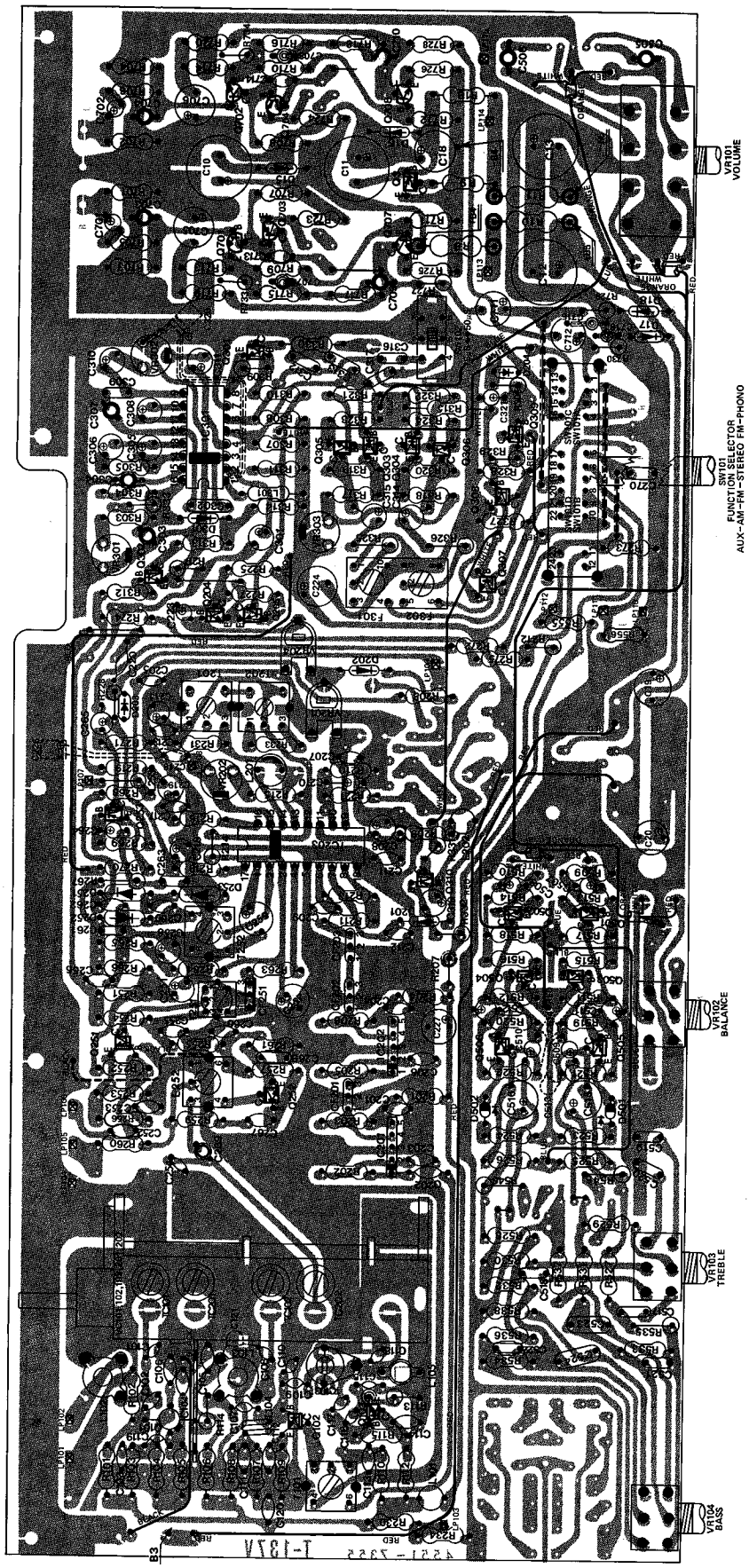
TUNER/EQUALIZER AMP/PRE AMP PC BOARD MULTI



TUNER/EQUALIZER AMP/PRE AMP PC BOARD



TUNER/EQUALIZER AMP/PRE AMP PC BOARD MULTI



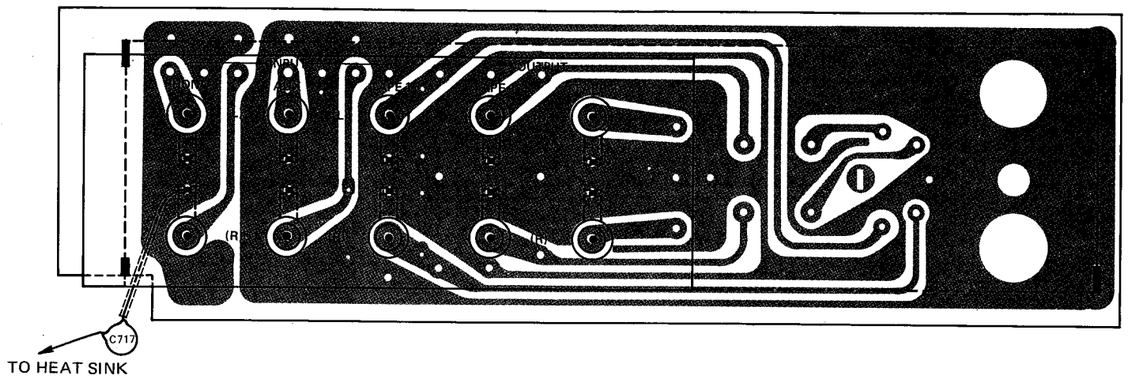
CIRCUIT REF.	H/K PART NO.	DESCRIPTION
RESISTORS (All resistors 1/4W, ±5% Carbon unless otherwise noted)		
VR101	22035563	Variable Resistor, 100 k ohm, Volume Control
VR102	22035564	Variable Resistor, 50 k ohm, Balance Control
VR103, 104	22035565	Variable Resistor, 100 k ohm, Treble and Bass Control
VR201	23535566	Variable Resistor, 10 k ohm
VR202	23535567	Variable Resistor, 4.7 k ohm
VR204	23535568	Variable Resistor, 50 k ohm
VR301	23535569	Variable Resistor, 3.3 k ohm
VR302	23535570	Variable Resistor, 33 k ohm
VR303	23532130	Variable Resistor, 220 ohm
CAPACITORS, ELECTROLYTIC		
C10, 11, 12, 13	31835571	330MF +50% –10% 16V
C18, 19, 20	31835572	22MF +50% –10% 16V
C208, 218, 321	31835573	10MF +50% –10% 16V
C210, 226	31835574	1MF +75% –10% 50V
C214, 319	31835575	47MF +50% –10% 10V
C219	31835576	4.7MF +50% –10% 25V
C224, 227	31835577	220MF +50% –10% 16V
C257, 265	31835574	1MF +75% –10% 50V
C258	31835576	4.7MF +50% –10% 25V
C259	31835578	3.3MF +75% –10% 25V
C301	31835579	2.2MF +75% –10% 50V
C305	31835580	0.47MF ±20% 50V
C306, 308, 310, 311	31835581	0.33MF ±20% 50V
C314, 315	31835576	4.7MF +50% –10% 25V
C320	31835582	47MF +50% –10% 16V
C507, 508	31835583	10MF ±20% 6.3V Tantalum
C509, 510	31835584	10MF ±20% 16V
C511, 512	31835585	3.3MF ±20% 25V
C515, 516	31835582	47MF +50% –10% 16V
C701, 702	31835586	33MF ±20% 6.3V Tantalum
C705, 706	31835587	330MF +50% –10% 6.3V
C711, 712	31835588	4.7MF ±20% 25V
VC101, 102, 103 201, 202	30834831A	Variable Capacitor (w/Trimmers TC101, 102, 201, 202)
TRANSISTOR		
Q3	43031312	2SA844(E) Voltage Regulator
Q101	43035590	F. E. T., 3SK45(B) FM RF Amp.
Q102, 103	43034834	2SC535(B) FM Mixer, FM Osc.
Q204, 205, 307, 308, 309	43028535	2SC1344(E) Stereo Indicator
Q251, 252	43035591	2SC461(B) AM Mixer, AM Osc.
Q253	43031312	2SA844(E) AM Demodulation
Q301, 302, 305, 306	43028535	2SC1344(E) Stereo/Mono Switching, MPX Osc. Stop Switching, MPX Output Amp.
Q303, 304, 310	43031312	2SA844(E) MPX Output Amp., Switch Muting Driver

CIRCUIT REF.	H/K PART NO.	DESCRIPTION
TRANSISTORS (continued)		
Q501, 502, 503, 504	43028535	2SC1344(E) Pre. Amp.
Q505, 506	43031312	2SA844(E) Pre. Amp.
Q701, 702, 707, 708	43035592	2SC1775(F) Equalizer Amp.
Q703, 704	43032151	2SA872(E) Equalizer Amp.
IC201, 202	43131313	Integrated Circuit, BA401 FM IF Amp.
IC203	43135593	Integrated Circuit, HA11211 FM IF Amp./ FM Det./AM IF Amp.
IC301	43135594	Integrated Circuit, HA11223(W) FM Multiplex
D15, 16, 17, 18	42035595	Zener Diode, RD15EB3 14.72V ±0.37V
D201, 202, 203, 204	41028593	Diode, 1S2076
D251, 252, 253	41528591	Diode, 1N34A
D301	41028593	Diode, 1S2076
D501, 502	38128520	Variator, MV11
COILS		
L101	12035596	RF Choke
L102	12035597	FM RF
L103	12035598	FM RF
L104	12034838	FM IF Trap
L105	12035599	FM Osc.
L201	12035600	Phase Shifter
L202	12035596	Bypass Filter
L252	12035602	AM Osc.
L253, 301	12035603	RF Choke, FA Choke
TRANSFORMERS		
T101	11035604	FM IF
T201	11035605	Quadrature Det.
T202	11035606	Quadrature Det.
T251	11035607	AM IF
T252	11035608	AM IF
MISCELLANEOUS		
CF201, 202, 203	12035609	Ceramic Filter, FM IF
CF251	12035610	Ceramic Filter, AM IF
F301, 302	12035611	L. C. Component, Low Pass Filter
SW101	24035612	Rotary Slide Switch, Function Selector

CIRCUIT REF.	H/K PART NO.	DESCRIPTION
RESISTORS (All resistors 1/4W, ±5% Carbon unless otherwise noted)		
VR101	22035563	Variable Resistor, 100 k ohm, Volume Control
VR102	22035564	Variable Resistor, 50 k ohm, Balance Control
VR103, 104	22035565	Variable Resistor, 100 k ohm, Treble and Bass Control
VR201	23535566	Variable Resistor, 10 k ohm
VR202	23535567	Variable Resistor, 4.7 k ohm
VR204	23535568	Variable Resistor, 50 k ohm
VR301	23535569	Variable Resistor, 3.3 k ohm
VR302	23535570	Variable Resistor, 33 k ohm
VR303	23532130	Variable Resistor, 220 ohm
CAPACITORS, ELECTROLYTIC		
C10, 11, 12, 13	31835571	330MF +50% −10% 16V
C18, 19, 20	31835572	22MF +50% −10% 16V
C208, 218, 321	31835573	10MF +50% −10% 16V
C210, 226	31835574	1MF +75% −10% 50V
C214, 319	31835575	47MF +50% −10% 10V
C219	31835576	4.7MF +50% −10% 25V
C224, 227	31835577	220MF +50% −10% 16V
C257, 265	31835574	1MF +75% −10% 50V
C258	31835576	4.7MF +50% −10% 25V
C259	31835578	3.3MF +75% −10% 25V
C301	31835579	2.2MF +75% −10% 50V
C305	31835580	0.47MF ±20% 50V
C306, 308, 310, 311	31835581	0.33MF ±20% 50V
C314, 315	31835576	4.7MF +50% −10% 25V
C320	31835582	47MF +50% −10% 16V
C507, 508	31835583	10MF ±20% 6.3V Tantalum
C509, 510	31835584	10MF ±20% 16V
C511, 512	31835585	3.3MF ±20% 25V
C515, 516	31835582	47MF +50% −10% 16V
C701, 702	31835586	33MF ±20% 6.3V Tantalum
C705, 706	31835587	330MF +50% −10% 6.3V
C711, 712	31835588	4.7MF ±20% 25V
VC101, 102, 103 201, 202	30834831A	Variable Capacitor (w/Trimmers TC101, 102, 201, 202)
TRANSISTOR		
Q3	43031312	2SA844(E) Voltage Regulator
Q101	43035590	F. E. T., 3SK45(B) FM RF Amp.
Q102, 103	43034834	2SC535(B) FM Mixer, FM Osc.
Q204, 205, 307, 308, 309	43028535	2SC1344(E) Stereo Indicator
Q251, 252	43035591	2SC461(B) AM Mixer, AM Osc.
Q253	43031312	2SA844(E) AM Demodulation
Q301, 302, 305, 306	43028535	2SC1344(E) Stereo/Mono Switching, MPX Osc. Stop Switching, MPX Output Amp.
Q303, 304, 310	43031312	2SA844(E) MPX Output Amp., Switch Muting Driver

CIRCUIT REF.	H/K PART NO.	DESCRIPTION
TRANSISTORS (continued)		
Q501, 502, 503, 504	43028535	2SC1344(E) Pre. Amp.
Q505, 506	43031312	2SA844(E) Pre. Amp.
Q701, 702, 707, 708	43035592	2SC1775(F) Equalizer Amp.
Q703, 704	43032151	2SA872(E) Equalizer Amp.
IC201, 202	43131313	Integrated Circuit, BA401 FM IF Amp.
IC203	43135593	Integrated Circuit, HA11211 FM IF Amp./ FM Det./AM IF Amp.
IC301	43135594	Integrated Circuit, HA11223(W) FM Multiplex
D15, 16, 17, 18	42035595	Zener Diode, RD15EB3 14.72V ±0.37V
D201, 202, 203, 204	41028593	Diode, 1S2076
D251, 252, 253	41528591	Diode, 1N34A
D301	41028593	Diode, 1S2076
D501, 502	38128520	Variator, MV11
COILS		
L101	12035596	RF Choke
L102	12035597	FM RF
L103	12035598	FM RF
L104	12034838	FM IF Trap
L105	12035599	FM Osc.
L201	12035600	Phase Shifter
L202	12035596	Bypass Filter
L252	12035602	AM Osc.
L253, 301	12035603	RF Choke, FA Choke
TRANSFORMERS		
T101	11035604	FM IF
T201	11035605	Quadrature Det.
T202	11035606	Quadrature Det.
T251	11035607	AM IF
T252	11035608	AM IF
MISCELLANEOUS		
CF201, 202, 203	12035609	Ceramic Filter, FM IF
CF251	12035610	Ceramic Filter, AM IF
F301, 302	12035611	L. C. Component, Low Pass Filter
SW101	24035612	Rotary Slide Switch, Function Selector

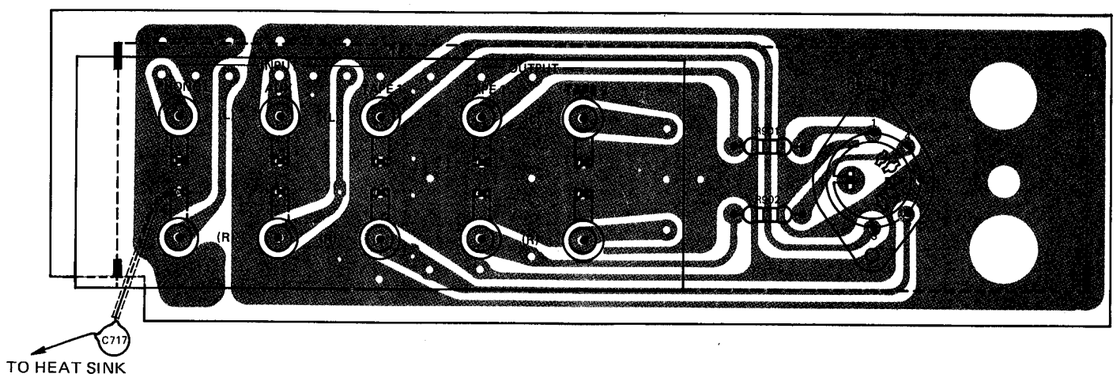
INPUT/OUTPUT JACK TERMINAL PC BOARD



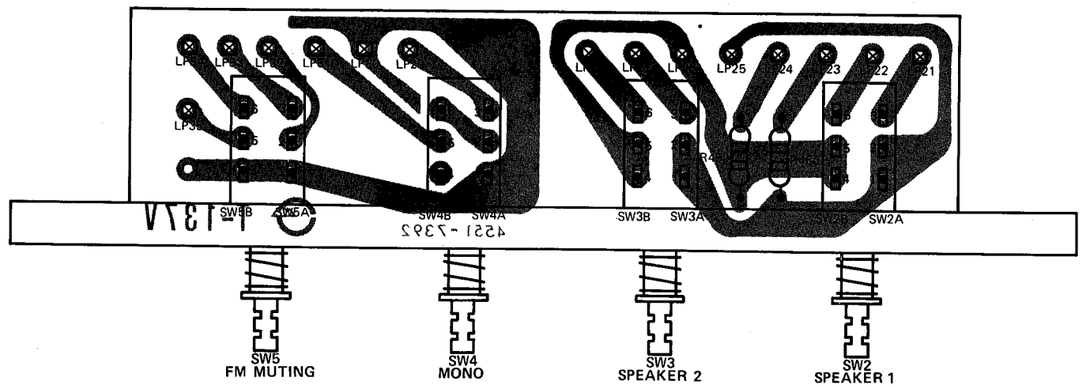
INPUT/OUTPUT JACK TERMINAL PC BOARD

CIRCUIT REF.	H/K PART NO.	DESCRIPTION
TE2	65433653	10-Pin Jack, Phono/Aux./Tape In/ Tape Out 1/Tape Out 2

INPUT/OUTPUT JACK TERMINAL PC BOARD MULTI

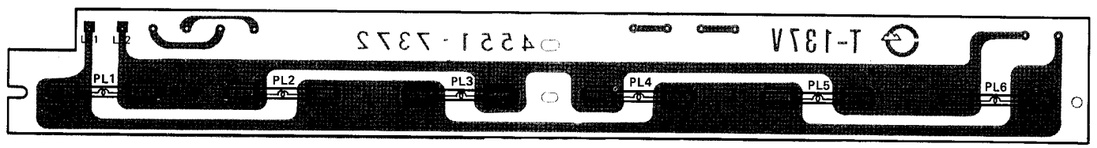


MODE/CONTROL SWITCH PC BOARD

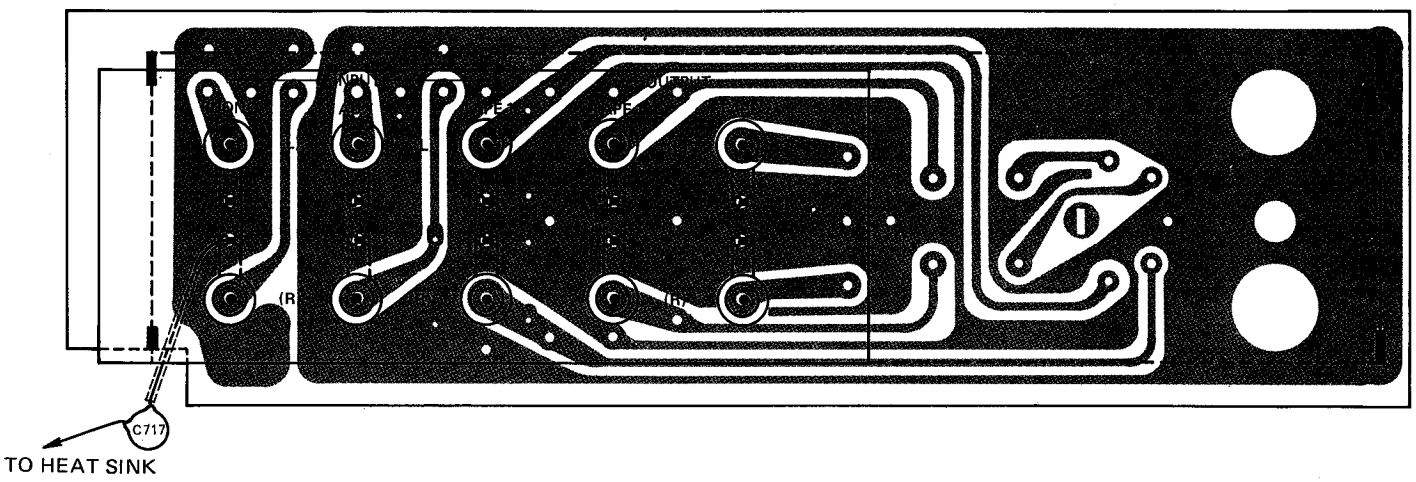


CIRCUIT REF.	H/K PART NO.	DESCRIPTION
SW2, 3, 4, 5	25035631	Push Switch, Speaker 1/Speaker 2/ Mono/FM Muting

LAMP HOLDER PC BOARD



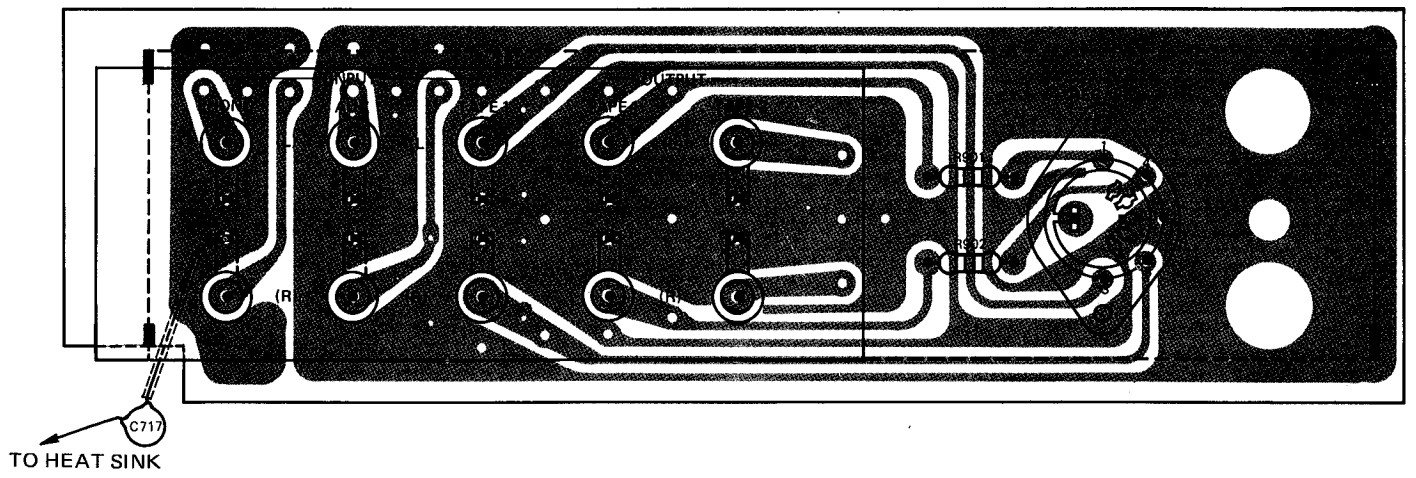
INPUT/OUTPUT JACK TERMINAL PC BOARD



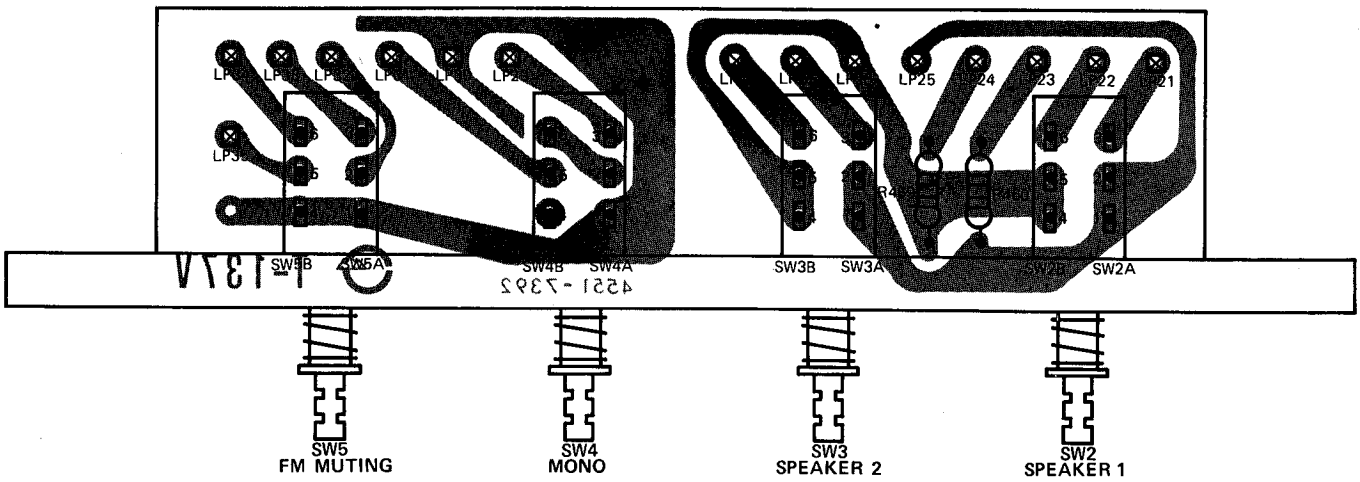
INPUT/OUTPUT JACK TERMINAL PC BOARD

CIRCUIT REF.	H/K PART NO.	DESCRIPTION
TE2	65433653	10-Pin Jack, Phono/Aux./Tape In/ Tape Out 1/Tape Out 2

INPUT/OUTPUT JACK TERMINAL PC BOARD MULTI

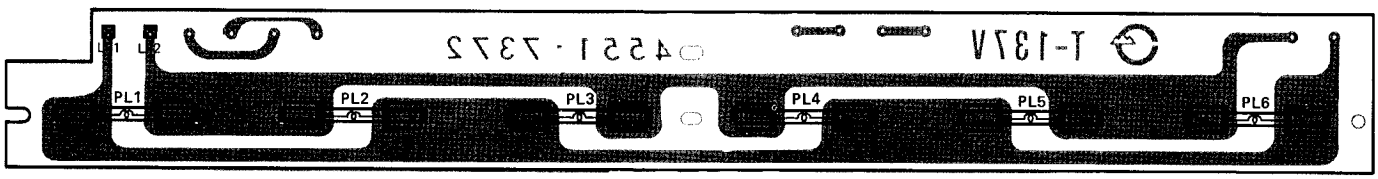


MODE/CONTROL SWITCH PC BOARD



CIRCUIT REF.	H/K PART NO.	DESCRIPTION
SW2, 3, 4, 5	25035631	Push Switch, Speaker 1/Speaker 2/ Mono/FM Muting

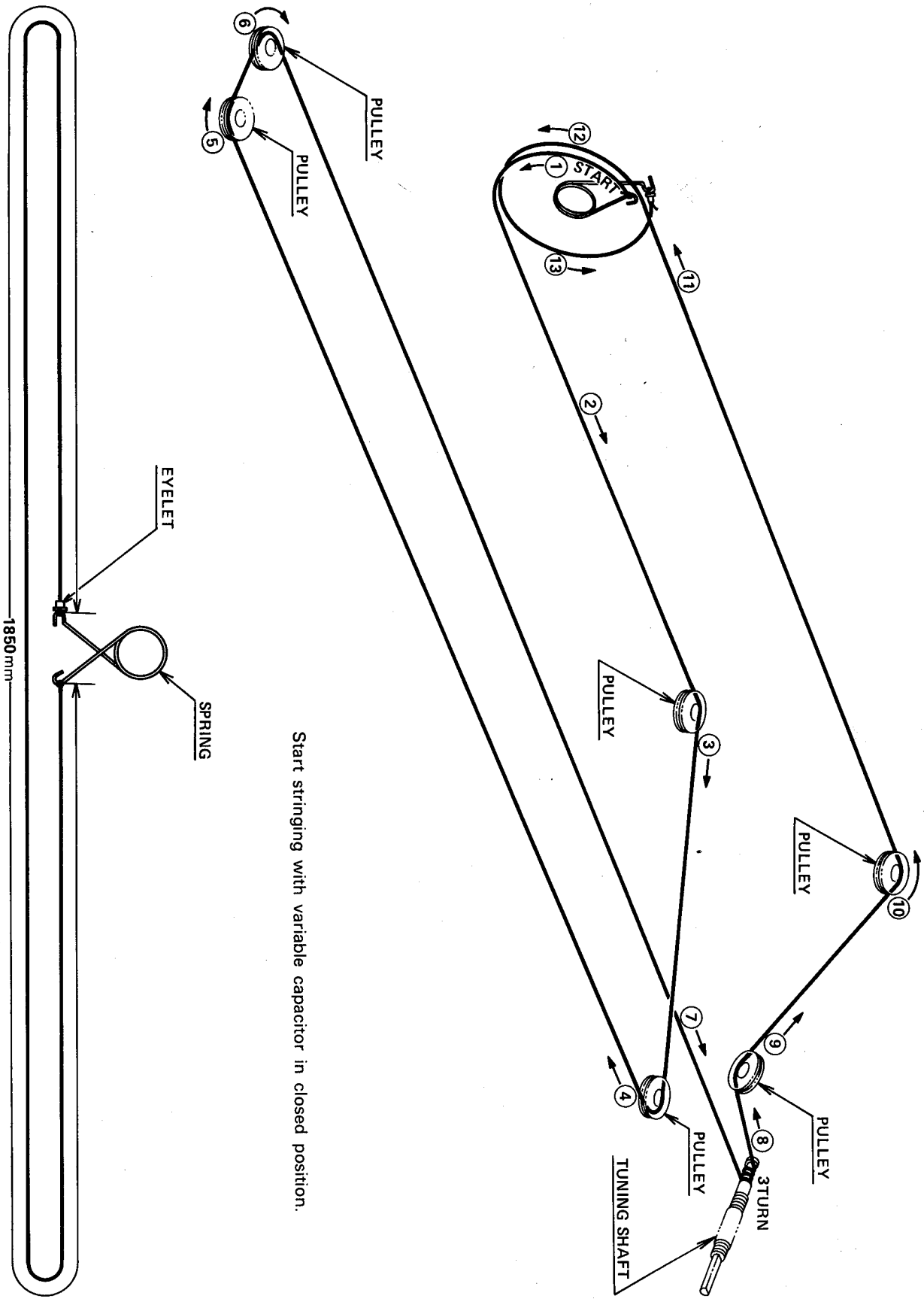
LAMP HOLDER PC BOARD



CHASSIS PARTS LIST

CIRCUIT REF.	H/K PART NO.	DESCRIPTION
GENERAL UNIT		
101	00235536	Clear Panel Assembly
102	00235537	Front Panel Assembly
103	00135538	Push Button Assembly, Speaker 1/ Speaker 2/Mono/FM Muting/Loudness (X5)
104	00235539	Knob Assembly, Function
105	00235540	Knob Assembly, Tuning
106	00235541	Dial Pointer Assembly
115	60135542	Cabinet Back
116	60135543	Cabinet Top
117	62035544	Feet, Cabinet Bottom (X4)
119	61035545	Dial Panel
121	64235546	Bracket, Clear Panel
122	64235547	Bracket, Front Panel Right
123	64235548	Bracket, Front Panel Left
146	60135549	Dressing Plate, Cabinet Back
149	63235550	Knob, Volume
157	63235551	Knob, Bass/Treble/Balance (X3)
161	63235552	Knob, Tape Monitor
169	63233663	Push Button, Power
ELECTRICAL		
T1	10135553	Power Transformer
SW1	25035554	Push Switch, Power
ME1	12535555	Tuning Meter
J1	65432119	Headphones Jack
SO1	67435556	External AC Socket, Switched
CB1, 2	45535557	Speaker Protector
TE1	65129518	FM/AM External Antenna Terminal
TE3, 4	65434823A	Speaker Output Terminal
FU1	45035558	Fuse, 3A 125V
FU2, 3	45035559	Fuse, 4A 125V
D10, 503	46735560	Light Emitting Diode, SLP132B Power Indicator, Tape Monitor Indicator
D302	46735561	Light Emitting Diode, GL4AR2 Stereo Indicator
L106	12031333	Coil, FM RF BALUN
L251	20535562	AM Ferrite Bar Antenna
PL1, 2, 3, 4, 5, 6	46529502	Dial Illuminator Lamp, 8V 300mA
MULTI VOLTAGE RECEIVER		
T1	10135634	Power Transformer
SW1	25035635	Push Switch, Power
FU1	45035636	Fuse, 3.15AT 250V
FU2, 3	45035637	Fuse, 4AT 250V
FU4	45035638	Fuse, 2.5AT 250V
SW8	24035639	Rotary Switch, Power Source Voltage Selector
SW102	24531335	Slide Switch, Emphasis
J2	65432127	5-Pin DIN Jack, REC/PB

DIAL CORD STRINGING



Start stringing with variable capacitor in closed position.